pp. 1–96] [January, 1943

TROPICAL DISEASES BULLETIN

IMPERIAL MYCOLOGICAL INSTITUTE
29 JAN 1943

VOL. 40.] 1943. [No. 1.

MAIN CONTENTS:

	PAGES
Summary of Recent Abstracts. I. Cholera	1–6
Malaria	6–17
Trypanosomiasis	18–23
Leishmaniasis	23–25
Fevers of the Typhus Group and Other Fevers	25–39
Yellow Fever	39–44
Sandfly Fever	45
Plague	46–51
Bacillary Dysentery	51–52
Amoebiasis and Intestinal Protozoal Infections	52–54
Relapsing Fever and Other Spirochaetoses	55–57
Leprosy	57–60
Helminthiasis	60–77
Deficiency Diseases	77–80
Venoms and Antivenenes ...	81–84
Miscellaneous	84–96
Reviews and Notices ..	96

For detailed Contents see pp, ii. iv, v and vi.

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/-.

HONORARY MANAGING COMMITTEE

APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES.

Chairman : A. G. H. Smart, *C.M.G.*, *M.B.E.*, M.D., D.P.H., D.T.M. & H. (*Chief Medical Adviser to the Secretary of State for the Colonies*).

Wm. Horner Andrews, D.Sc., M.R.C.V.S.

Sir Wilson Jameson, LL.D., M.D., F.R.C.P. (*representing the Ministry of Health*).

Sir Arthur Horn, *C.M.G.*, M.D., M.R.C.P., D.T.M.

Professor Sir John Ledingham, *C.M.G.*, LL.D., D.Sc., M.B., F.R.C.P., F.R.S. (*representing the Royal Society*).

G. Carmichael Low, M.D., F.R.C.P.

Sir Philip Manson-Bahr, *C.M.G.*, *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

Major-General Sir Ernest W. C. Bradfield, *K.C.I.E.*, I.M.S. (retd.).

Sir Edward Mellanby, *K.C.B.*, M.D., F.R.C.P., F.R.S., K.H.P. (*representing the Medical Research Council*).

Lt.-Col. G. S. Parkinson, *D.S.O.*, M.R.C.S., L.R.C.P., D.P.H., R.A.M.C. (retd.)

The Honourable E. Baring (*representing the Foreign Office*).

J. B. Sidebotham (*of the Colonial Office*).

Secretary : C. A. Grossmith, *of the Colonial Office.*

STAFF OF THE BUREAU :

Acting Director : Charles Wilcocks, M.D., D.T.M. & H.

Secretary : R. L. Sheppard.

LIST OF ABSTRACTERS IN THIS ISSUE.

E. W. Adams, *O.B.E.*, M.D.

Professor D. B. Blacklock, M.D., D.P.H.

Professor P. A. Buxton, M.A., M.R.C.S., L.R.C.P., D.T.M. & H. (*Sectional Editor*).

C. C. Chesterman, *O.B.E.*, M.D., M.R.C.P., D.T.M. & H.

Professor H. N. Green, M.D., M.Sc.

Lt.-Col. W. F. Harvey, *C.I.E.*, M.B., F.R.C.P.E., D.P.H., I.M.S. (retd.) *Sectional Editor*).

F. Hawking, D.M., D.T.M.

Professor Edward Hindle, M.A., Sc.D., Ph.D., F.R.S. (*Sectional Editor*).

C. A. Hoare, D.Sc.

G. Lapage, M.D., M.Sc.

F. O. MacCallum, B.Sc., M.D.

Sir Philip Manson-Bahr, *C.M.G.*, *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

Maj.-Gen. Sir John W. D. Megaw, *K.C.I.E.*, D.Sc., M.B., B.Ch., I.M.S. (retd.) (*Sectional Editor*).

Charles Newman, M.D., F.R.C.P.

Maj.-Gen. Sir Leonard Rogers, *K.C.S.I.*, *C.I.E.*, M.D., F.R.S., I.M.S. (retd.) (*Sectional Editor*).

Sir H. Harold Scott, *K.C.M.G.*, M.D., F.R.C.P., D.P.H., D.T.M. & H.

Professor V. P. Sydenstricker.

C. M. Wenyon, *C.M.G.*, *C.B.E.*, M.B., B.S., B.Sc., F.R.S. (*Sectional Editor*).

V. B. Wigglesworth, M.D., B.Ch., F.R.S.

F. Norman White, *C.I.E.*, M.D., D.P.H., I.M.S. (retd.) (*Sectional Editor*).

211 pages. Price 7*s*. 6*d*. net.

SUPPLEMENT
to the
Tropical Diseases Bulletin
for **December, 1940**

Summarizing the
MEDICAL AND SANITARY REPORTS from BRITISH COLONIES, PROTECTORATES and DEPENDENCIES, FOR THE YEAR 1938.

Orders should be sent to the

BUREAU OF HYGIENE and TROPICAL DISEASES

Keppel Street, Gower Street, London, W.C.1.

Chaulmoogra treatment of LEPROSY

'MOOGROL' TRADE MARK

Chaulmoogra oil is recognised as the most effective agent available for the treatment of Leprosy. With the development of improved preparations of Chaulmoogra a cure can reasonably be expected especially if treatment is not delayed. A recently published report finds 'Moogrol'—a mixture of the ethyl esters of the acids of the chaulmoogric series—to give the most satisfactory results.

Available in bottles of 25 *c.c.*, 100 *c.c. and* 1 *litre.*

BURROUGHS WELLCOME & CO.
(The Wellcome Foundation Ltd.) **LONDON**

MEDICAL RESEARCH COUNCIL.

BULLETIN OF WAR MEDICINE

Edited by the Staff of the Bureau of Hygiene and Tropical Diseases.

A collection of abstracts and critical reviews of papers in the British and foreign medical press which have a direct bearing on medical and surgical problems arising from the war.

The first six numbers (Sept. 1940–July 1941) with Index, constitute Volume I, which contains 424+xxiii pages. Volume II (Sept. 1941–July 1942) consists of six numbers with Index and contains 540+xxx pages. The price of each number is 2/6. From September 1942, (the beginning of Volume III), the Bulletin appears monthly, at a cost of 1/3 per number.

Obtainable from

HIS MAJESTY'S STATIONERY OFFICE:

LONDON, W.C.2: York House, Kingsway. EDINBURGH 2: 120 George Street. CARDIFF: 1 St. Andrew's Crescent, MANCHESTER 1: 26 York Street. BELFAST: 80 Chichester Street; or through any bookseller.

Vol. 40. No. 1.]

CONTENTS

[January, 1943

		PAGE
Summary of Recent Abstracts. I.	**Cholera**	1–6
	MALARIA.	
FIELD	Morphological Variation in *Plasmodium vivax*	6
ZUMPT	The Question of Races in *A. maculipennis*	7
SCHWETZ	Anopheles of the Region round Lake Kivu and Lake Albert, Belgian Congo	7
RUSSELL & RAO	On the Swarming, Mating, and Ovipositing Behaviour of *A. culicifacies*	8
RAO, ROY & RAO	The Swarming and Pairing of *A. sundaicus* and *A. subpictus*	9
MURRAY & SHUTE	A Case of *P. falciparum* Malaria	9
MOHR	Cardiac Lesions in Malaria	10
KOPP	Plasma Proteins in Therapeutic Fever ...	10
DULANEY, STRATMAN-THOMAS & WARR	The Diagnostic Value of Complement Fixation in Malaria	11
BOYD	Criteria of Immunity and Susceptibility in Vivax Malaria Infections	11
HASSELMANN; PETER	The Mechanism of the Incidental Effects of Plasmoquine in Malaria	12–13
VIDELA	Chronic Malarial Splenemogaly: Treatment with Calcium Chloride	13
MOHR	Malaria and Assimilation of Vitamin C ...	13
RUSSELL, KNIPE & RAO	A Water Emulsion of Pyrethrum Extract for Spray-Killing Mosquitoes	14
POGODINA & SOKOLOV	Alkaloidal Fogs for combating Mosquitoes...	15
ROBERTSON, LEPRINCE, JOHNSON & PARKER	Experimental Malaria Control Drainage Ditch Linings	15
DAVID	Tests for the Suitability of Mineral Oils as Larvicides	16
HOWARD & ANDREWS	Studies on Paris-Green-Lime Mixtures as Larvicides	16
HINMAN, CROWELL & HURLBUT ...	Studies on Copper Arsenite as Larvicide ...	17
BISHOP	Chemotherapy and Avian Malaria	17
	TRYPANOSOMIASIS.	
CAMPOURCY	Infection of *G. palpalis* with *T. gambiense* in the Cameroons	18
TROLLI & VAN WYMEERSCH	Diagnosis of Trypanosomiasis in Chenal and Kwango by Stained Thick Blood Film ...	18
DAVID & PAPE	Two Cases of Hereditary Trypanosomiasis	19
FULTON & YORKE	Trypanocidal Action of Additional Aromatic Diamidines	19
DUBOIS & KOHN	Infectivity of Trypanosomes during Chemotherapeutic Treatment	19
KING & STRANGEWAYS	Relation between Chemical Structure and Drug-Resistance among Arsenicals ...	20
COLLIER, FULTON & INNES	The Oedema of Mice Infected with *Tryp. cruzi*	21
MAZZA, BASSO & BASSO	Treatment of Chagas's Disease with 9736 (As) Bayer compared with 7602 (Ac) ...	22
	LEISHMANIASIS.	
BOIX BARRIOS	Epidemiology of Infantile Kala Azar ...	23
FULTON & YORKE	Increased Toxicity of Old Solutions of Stilbamidine	23
LATYSHEV & KRIUKOVA	The Cutaneous Leishmaniasis of Wild Rodents in Turkmenia	24
SMITH	Late Recurrence of S. American Leishmaniasis after Antimony Treatment ...	25
SIMONETTI	X-Ray Treatment of Oriental Sore	25
IRIARTE	Leishmaniasis in Venezuela	25

Continued on p. iv.

BOOKS

H. K. LEWIS & Co. Ltd.

MEDICAL PUBLISHERS AND BOOKSELLERS

LARGE STOCK OF TEXTBOOKS AND RECENT LITERATURE
IN ALL BRANCHES OF MEDICINE AND SURGERY

Foreign Medical and Scientific Books not in stock obtained under Licence.

To Colonial Libraries, Colleges and similar Institutions, and to residents in India, South Africa, Australia, etc., the publications of any publisher can be supplied promptly. Books advertised or reviewed in this Journal can be supplied to order.

DEPARTMENT FOR SECOND-HAND BOOKS—140 GOWER STREET
Please state interests when writing.

Medical & Scientific Lending Library

Close to Euston Square Station (*Metropolitan Railway*), Warren Street Tube Station.

ANNUAL SUBSCRIPTION
Town or Country from One Guinea.

The **Library Catalogue,** revised to December 1937 with Supplement 1938–1941, containing classified index of authors and subjects, **20s.** net. (to subscribers, **10s.** net). Supplement separately, **4s.** net (to subscribers, **2s.** net), postage **8d.**

Prospectus post free on request.

BI-MONTHLY LIST of NEW BOOKS and NEW EDITIONS added to the Library post free on application

136 GOWER STREET, LONDON, W.C.1
Telegrams: "PUBLICAVIT, WESTCENT LONDON." Telephone: EUSton 4282 (5 lines)

LIVERPOOL SCHOOL OF TROPICAL MEDICINE

UNIVERSITY OF LIVERPOOL.

Courses of Instruction.

Arrangements have been made with the London School of Hygiene and Tropical Medicine and with the Colonial Office that, for the duration of the war, courses of instruction in tropical medicine and hygiene will be held alternately in London and Liverpool. The next courses for the Diplomas in Tropical Medicine and Tropical Hygiene will commence on a date to be announced later.

Prospectus from the Laboratory Secretary, School of Tropical Medicine, Pembroke Place, Liverpool, 3.

Treatment of Patients.

There is an out-patient department at the School for all sufferers from diseases contracted in the tropics. Cases needing hospital treatment are admitted to the Tropical Ward (general and private wards) of the Liverpool Royal Infirmary, which adjoins the School. Special arrangements are made for Civil Servants and for members of certain firms who are regular subscribers to the School.

Vol. 40. No. 1.] **CONTENTS**—*Continued from p.* ii. [January, 1943

FEVERS OF THE TYPHUS GROUP AND OTHER FEVERS.

		PAGE
PINKERTON	Nature, Biologic Properties, and Classification of the Pathogenic Rickettsiae ...	25
MEGAW	Louse-borne Typhus Fever	27
ZIMMERMANN	Epidemiology of Typhus Fever in German-Occupied Poland	27
LÖFFLER & MOOSER	Modes of Transmission of Typhus Fevers ...	28
DONALD & BARKER	Louse-borne Typhus Fever	30
DENNIG	Differential Diagnosis of Typhus	30
BURY	Treatment of Typhus Fever by Sulphonamides...	31
STURM	Symptomatic Treatment of Typhus Fever ...	32
GOLD & FITZPATRICK	Typhus Fever in a Previously Vaccinated Laboratory Worker	32
COMBIESCU, ZOTTA, MANCIULESCU, POP & TASCAU	Protective Inoculation of Guineapigs against Typhus by Formol-killed Rickettsiae from the Lungs of Mice and Dogs	34
GIROUD & PANTHIER	Inoculation of Guineapigs with Rickettsia of Typhus from the Lung of the Mouse or Rabbit.	35
GIROUD & PANTHIER	Adaptation of the Rickettsia of Historic Typhus to the Lung of the Rabbit ...	35
GIROUD	Antigenic Power of Extracts from Lungs of Rabbits Infected with Typhus compared with that of the Isolated Rickettsiae ...	36
CARRETERO	Murine Typhus in Valparaiso	36
BARLOVATZ & JOUKOVSKY	Pseudo-Boutonneuse Fever in the Belgian Congo	37
SYLLA	Wolhynian Disease (Trench Fever)	38

YELLOW FEVER.

HARRIS	The Culicines of Tanganyika...	39
VAN DEN BERGHE	Sudden Variation in the Neurotropic French Strain of Yellow Fever Virus	40
JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION	Outbreak of Jaundice in the Army	40
FOX, MANSO, PENNA & PARÁ	Occurrence of Icterus in Brazil following Vaccination against Yellow Fever	41
FOX, LENNETTE, MANSO & AGUIAR ...	Encephalitis following Vaccination with 17D Yellow Fever Virus...	44

SANDFLY FEVER.

PERFILIEV & PODOLJAN	Prophylaxis of Phlebotomus Fever by means of Sandfly Control	45

PLAGUE.

MOLL & O'LEARY	Plague in Venezuela	46
MACCHIAVELLO	Bacteriology of Plague in North East Brazil	46
MACCHIAVELLO	Bacteriology of the Cold Inguinal Bubo ...	46
MACCHIAVELLO	Bacteriology of Multiglandular Plague ...	47
MACCHIAVELLO	Study of Variability of the Plague Bacillus...	47
MACCHIAVELLO	Atypical Variants of the Plague Bacillus from N.E. Brazil	48
MACCHIAVELLO & PARACAMPOS; MACCHIAVELLO	Viability and Virulence of *P. pestis* in the Tropics	48–50
JUNIOR	Diagnosis and Treatment of Plague in Man and Rodents	50

Continued on p. v.

Vol. 40. No. 1.] **CONTENTS**—*Continued from p.* iv. [January, 1943

BACILLARY DYSENTERY.

		PAGE
Briceño-Iragorri	Bacillary Dysentery in Venezuela	51
Walther & Günther	Chloride Content of the Serum in Flexner Dysentery	51
Poole	Dysentery and Diarrhoea in Wartime ...	52

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

Dobell	New Methods for studying Intestinal Amoebae and other Protozoa	52
Sapero, Hakansson & Louttit ...	Occurrence of Two Distinct Races of *Endamoeba histolytica*	53
d'Antoni	Amoebic and Bacillary Colitis in New Orleans	53
Ormiston, Taylor & Wilson ...	Enteritis in a Nursery Home associated with *Giardia lamblia*	54

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

Adler & Ashbel	Behaviour of *Spirochaeta persica* in *Pediculus humanus*	55
Ashbel	Observations on Some Strains of *S. persica* in Palestine	55
Moustardier	The First Case of Sodoku observed in French Equatorial Africa	56
Ceccaldi & Guilhaumou	Isolation of *Spirillum morsus muris* from the First Case of Sodoku in French Equatorial Africa	56
Nitti, Boyer & Conge	Action of *p*-amino-phenyl-sulphamide in Experimental Rat-Bite Fever	57

LEPROSY.

British Empire Leprosy Relief Association (Indian Council) ...	Annual Report, 1941	57
Gehr	Leprosy in the Balkans	59
Gehr & Gehr	Leprosy in Spain and Portugal	60

HELMINTHIASIS.

Erhardt; Eichholtz & Erhardt ...	Chemotherapeutic Experiments with Anthelmintics with Special Consideration of the Phenol Derivative 430 K1	60–61
Minning	Immunological Methods for the Diagnosis of Bilharzia	63
Byrd	The Opossum as New Host for Paragonimus in Tennessee...	65
Gotor	The Diagnosis of Cerebral Cysticercosis ...	65
Wilkins	A Simple Method of counting Hookworm Eggs in Faeces	67
Heilig	Pathological Heart Conditions in Hookworm Disease	68
Nickel	Amoebiasis and Hookworm Infection in Mississippi	70
Galliard	The Mechanism of the Transmission of Filariae by Culicidae	71
Rutishauser	Modifications of the Operation for Scrotal Elephantiasis. (Figs.)	72
Young & Gordon	Onchocerciasis in a West African Native on Service in East Africa	73
Enzer	Treatment of Onchocerciasis	73
Vargas	The Development of *Onchocerca volvulus* in Simuliidae	74
Culbertson	Active Immunity in Mice against *Trichinella spiralis*	75
Culbertson	Passive Transfer of Immunity to *T. spiralis* in the Rat	77

Continued on p. vi.

DEFICIENCY DISEASES.

		PAGE
Ferro-Luzzi	Peculiar Form of Tropical Pseudo-tabes ...	77
Scarborough	Circumcorneal Injection as Sign of Riboflavin Deficiency in Man with Account of 3 Cases of Riboflavinosis	78
Díaz Rubio	The Gastric Secretion in Pellagra	79
Díaz Rubio & Lara Roldán ...	Radiological Examination of the Stomach in Pellagra	79
Díaz Rubio	Pellagra and the Bodily Constitution ...	80
Khorana, Sarma & Giri	The Nicotinic Acid Content of Fish and Other Marine Products	80

VENOMS AND ANTIVENENES.

Stanley-Jones & Harris	A Case of Adder Bite	81
Pergola	Eye Lesions due to Venom of *Naja nigricollis*	81
Iyenger, Dutt & Mukerji	*In vivo* Action of Cobra Venom on the Proteolytic System in Blood	81
de Magalhães	Scorpion Sting	82
Mohammed	Use of Atropine and Ergotoxine in Preparation of Antiscorpion Serum	82
Gajardo-Tobar	Poisoning by the Bite of *Latrodectus mactans*	83

MISCELLANEOUS.

Sonnenschein	Health Services in South-West Africa since 1918	84
Blanc & Baltazard	Transmission of the Bacillus of Whitmore by Biting Insects	85
Spencer	Ainhum associated with Hyperkeratosis Palmaris et Plantaris	85
Gilman	Fish Poisoning in the Porto Rico—Virgin Islands Area...	86
Jiménez-Diaz, Roda, Ortiz de Landázuri, Marina & Lorente; Jiménez-Diaz & Vivanco	Studies in Lathyrism	87
Chopra, Chopra & Chopra	Minor Drug Habits of India	87
Wigglesworth	Notes on the Integument of Insects in relation to the Entry of Contact Insecticides	89
Melnikov, Sukhareva & Fedder ...	Structure and Insecticidal Properties of Organic Compounds	90
Richards	Differentiation between Toxic and Suffocating Effects of Petroleum Oils on Mosquito Larvae	90
Hafez	The Problem of Fly Control in Egypt ...	91
Harrell & Moseley	The Surgical Treatment of Subdermal Myiasis due to *Dermatobia hominis* ...	93
Guntscheff	Myiasis of the Tongue	93
Fischer	Fitness for Life in the Tropics	93
Heiss	The Effects of Heat and their Treatment ...	94
Tenner	Permanent Damage from Heat Stroke ...	94
Gay Prieto, López de Azcona, Azúa, Bondeu & Cárdenas	Experimental Investigation of a Case of Solar Urticaria	94
Sonnenschein	House and Hospital Construction in the Tropics	95

REVIEWS AND NOTICES.

Pearse	Introduction to Parasitology	96

ALPHABETICAL LIST OF AUTHORS OR SOURCES

Adler, S. & Ashbel, R., 55.
d'Antoni, J. S., 53.
Ashbel, R., 55.

Barlovatz, A. & Joukovsky, T., 37.
Bishop, A., 17.
Blanc, G. & Baltazard, M., 85.
Boix Barrios, J., 23.
Boyd, M. F., 11.
Briceño-Iragorri, L., 51.
British Empire Leprosy Relief Association (Indian Council), 57.
Bury, K. J., 31.
Byrd, E. E., 65.

Campourcy, 18.
Carretero, A. V., 36.
Ceccaldi, J. & Guilhaumou, F., 56.
Chopra, R. N., Chopra, G. S. & Chopra, I. C., 87.
Collier, H. O. J., Fulton, J. D. & Innes, J. R. M., 21.
Combiescu, D., Zotta, G., Manciulescu, E., Pop, A. & Tascau, J., 34.
Cotter, E., 57.
Culbertson, J. T., 75, 77.

David, W. A. L., 16.
David & Pape, 19.
Dennig, 30.
Diaz Rubio, M., 79, 80.
—— & Lara Roldán, L., 79.
Dobell, C., 52.
Donald, C. & Barker, P. B., 30.
Dubois, A. & Kohn, I., 19.
Dulaney, A. D., Stratman-Thomas, W. K. & Warr, O. S., 11.

Eichholtz, F. & Erhardt, A., 61.
Enzer, J., 73.
Erhardt, A., 60.

Ferro-Luzzi, G., 77.
Field, J. W., 6.
Fischer, O., 93.
Fox, J. P., Lennette, E. H., Manso, C. & Aguiar, J. R. S., 44.
——, Manso, C., Penna, H. A. & Pará, M., 41.
Fulton, J. D. & Yorke, W., 19, 23.

Gajardo-Tobar, R., 83.
Galliard, H., 71.
Gay Prieto, J., López de Azcona, J. M., Azúa, L., Bondeu, F. & Cárdenas, M., 94.
Gehr, E., 59.
—— & Gehr, E., 60.
Gilman, R. L., 86.
Giroud, P., 36.
—— & Panthier, R., 35 *bis*.
Gold, H. & Fitzpatrick, F., 32.
Gotor, P., 65.
Guntscheff, N., 93.

Hafez, M., 91.
Harrell, W. B. & Moseley, V., 93.
Harris, W. V., 39.
Hasselmann, C. M., 12.
Heilig, R., 68.
Heiss, F., 94.
Hinman, E. H., Crowell, R. L. & Hurlbut, H. S., 17.
Howard, R. S., Jr. & Andrews, J., 16.

Iriarte, D. R., 25.
Iyenger, N. K., Dutt, N. K. & Mukerji, B., 81.

Jiménez-Díaz, C., Roda, E., Ortiz de Landázuri, E., Mariña, C. & Lorente, L., 87.
—— & Vivanco, F., 87.
Journal of the American Medical Association, 40.
Junior, M. S., 50.

Khorana, M. L., Sarma, M. L. & Giri, K. V., 80.
King, H. & Strangeways, W. I., 20.
Kopp, I., 10.

Latyshev, N. I. & Kriukova, A. P., 24.
Löffler, W. & Mooser, H., 28.

Macchiavello, A., 46 *bis*, 47 *bis*, 48, 49.
—— & Paracampos, H., 48, 49 *bis*, 50.
de Magalhães, O., 82.
Mazza, S., Basso, G. & Basso, R., 22.
Megaw, J. W. D., 27.
Melnikov, N. N., Sukhareva, N. D. & Fedder, M. L., 90.
Minning, W., 63.
Mohammed, A. H., 82.
Mohr, W., 10, 13.
Moll, A. A. & O'Leary, S., 46.
Moustardier, G., 56.
Murray, J. E. & Shute, P. G., 9.

Nickel, H. S., 70.
Nitti, F., Boyer, F. & Conge, M., 57.

Ormiston, G., Taylor, J. & Wilson, G. S., 54.

Pearse, A. S., 96.
Perfiliev, P. P. & Podoljan, V. J., 45.
Pergola, A., 81.
Peter, F. M., 13.
Pinkerton, H., 25.
Pogodina, E. A. & Sokolov, A. G., 15.
Poole, L. T., 52.

Rao, V. V., Roy, B. B. & Rao, P. J., 9.
Richards, A. G., Jr., 90.
Robertson, J. L., Jr., LePrince, J. A., Johnson, H. A. & Parker, W. V., 15.
Russell, P. F., Knipe, F. W. & Rao, T. R., 14.
—— & Rao, T. R., 8.
Rutishauser, A., 72.

Sapero, J. J., Hakansson, E. G. & Louttit, C. M., 53.
Scarborough, H., 78.
Schwetz, J., 7.
Simonetti, G., 25.
Smith, J. F., 25.
Sonnenschein, C., 84, 95.
Spencer, G. A., 85.
Stanley-Jones, D. & Harris, C. E. S., 81.
Sturm, A., 32.
Sylla, A., 38.

Tenner, K., 94.
Trolli, G. & van Wymeersch, 18.

Van den Berghe, L., 40.
Vargas, L., 74.
Videla, C. A., 13.

Walther, G. & Günther, L., 51.
Wigglesworth, V. B., 89.
Wilkins, E. G., 67.

Young, W. A. & Gordon, S., 73.

Zimmermann, E., 27.
Zumpt, F., 7.

on active service!

'NOVARSENOBILLON'

TRADE MARK

'Novarsenobillon' was first marketed during the last World War. In this present war it is once more on active service, a valuable weapon in the armamentarium of service and civilian doctors, its reliability against syphilis emphasising its well-earned title of THE PREMIER ORGANIC ARSENICAL

BRAND NEOARSPHENAMINE

★ 'NOVARSENOBILLON' is available in:

Ampoules of 0.30 gramme	...	3/0d.
,, ,, 0.45 ,,	...	4/0d.
,, ,, 0.60 ,,	...	5/0d.

Also in boxes of ten ampoules.

★ 'BIPOULE' double ampoules containing sterile redistilled water, at an additional cost of ... ... 6d. each

Exempt from purchase tax

★ TRADE MARK

THE PREMIER ORGANIC ARSENICAL

Our Medical Department will be glad to supply you with further information.

PHARMACEUTICAL SPECIALITIES (MAY & BAKER) LTD., DAGENHAM, ENGLAND

c829

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 40.] 1943. [No. 1.

SUMMARY OF RECENT ABSTRACTS.*

I. CHOLERA.

Epidemiology.

LAL and his collaborators (p. 157) have instituted a statistical enquiry into the epidemiology of cholera in Bengal. There is considerable variation between districts in respect of cholera experience, and the authors have, as a preliminary step, divided the region into areas having homogeneous cholera experience. They recognize three variables in the incidence of cholera :—seasonal, annual and residual ; the " net endemicity " has been determined by taking into account all factors and eliminating differences due to population density, size etc., and this has been used to classify the homogeneous districts into endemic and non-endemic groups.

VERGHESE (p. 158) reports that 1939 was a year of epidemic cholera in Orissa, and that the coastal deltaic districts, which in great measure remain submerged during the rains, suffered most. Practically all the main water supplies are open to gross contamination, and though the usual preventive measures of inoculation, and disinfection of water, are always adopted, it would seem that more permanent measures are necessary. The chief of these would be the provision of large numbers of deep masonry wells. Temporary measures which have been taken in the past are regarded as wasteful, and may be so in the future. The influence of fairs and festivals on cholera is noted. CHATTERJI (p. 458) agrees with VERGHESE that improvement of water supplies is the most important permanent preventive measure, but notes that the simultaneous adoption of drainage schemes is necessary, to avoid the risk that stagnation of waste water may give rise to water-borne diseases and malaria.

POLLITZER *et al.* (p. 159) state that an outbreak in Yunnan was initiated by two men who arrived from Kweichow. In the succeeding five months there were 3,486 cases with 2,515 deaths. KUBOTA (p. 159) refers to an outbreak in Canton during 1939.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1942, Vol. 39. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Aetiology.

TAYLOR (p. 836) has issued a review of cholera research in India, in which certain fundamental principles are laid down. In the investigation of the serology of vibrios, standard O antigen was prepared from Inaba and Ogawa strains only, and from this (dried) antigen, testing sera were prepared locally. It was found that the incidence of vibrios inagglutinable with O group I was no greater in cholera patients than in the general population, which indicates that such vibrios play no part in the pathogenesis of the disease. In India the El Tor vibrio is not known to exist except in certain waters of Bengal [but see below]. A combination of positive Heiberg classification (mannose+, arabinose—saccharose+), positive cholera-red reaction and negative Voges-Proskauer reaction may justify a presumptive diagnosis of *V. cholerae*. Taylor points out that in cholera the carrier, such as is known in diseases of the typhoid group, does not exist—the cholera convalescent and the contact carrier in most cases are free from the vibrios after five days from the onset of the attack or contact with the connected case. *V. cholerae* can, however, persist for 16 days in water, but has not been isolated except in immediate relationship with a cholera case. The cholera case, therefore, is the major factor in spread; contacts and infected water sources act as intermediaries for short periods only and at short range.

VENKATRAMAN *et al.* (p. 160), however, announce the finding of non-haemolytic vibrios indistinguishable from *V. cholerae* in two water sources of S. India, in the absence of cholera.

VENKATRAMAN and RAMAKRISHNAN (p. 458) take note of the difficulty of preserving alive *V. cholerae* in specimens of stool sent to laboratories for examination. They propose a preserving medium consisting of a buffered sea-salt solution, the details of which are given. In a trial of this, isolation of *V. cholerae* was effected up to 92 days after collection; from 66 samples taken from cases, isolation was possible in 64 instances in the field and in 60 in the laboratory. VENKATRAMAN (p. 161) notes that cholera vibrios in 2 per cent. salt solution containing 1/50,000 peptone, with a *p*H initially of 9·2, survived as long as 198 days, and that *V. cholerae* could be recovered for 21 days from faeces preserved in boric-acid-potassium-chloride-buffer-saline.

CAMPBELL-RENTON (p. 617) shows that cholera vibrios may remain viable, after desiccation, for 4 years, but that, in spite of this, desiccation does cause death of a large proportion of the organisms. The haemolytic factor of El Tor vibrios was still preserved after four years of desiccation, even in cracked tubes from which no growth could be obtained.

GOHAR (p. 161) states that alkaline peptone water containing 1 in 1,000,000 potassium tellurite is a useful medium for the isolation of *V. cholerae*. The culture should be plated out after 8 to 10 hours at 37°C.

GORDON and JOHNSTONE (p. 617) have shown that the serum of the normal guineapig is bactericidal for a number of organisms, including vibrios, and that after absorption with one organism the bactericidal property of the serum is reduced to that organism more than to others. By the use of this method it has been possible to detect antigenic differences between *V. cholerae* and related vibrios and to distinguish strains of *V. cholerae* which differ antigenically from the main group.

BANERJEE (p. 618) has obtained a toxin from cultures of *V. cholerae* by dialysis into a cellophane sac containing normal saline. Toxin was prepared from the diffusate, not by filtration, which reduces toxicity, but by centrifugation. Residual organisms were killed. There is little difference between toxin prepared from aerobic, and that from anaerobic, growth; the minimum lethal doses are 1·0 cc. intraperitoneally for guineapigs, and 0·25 cc. intravenously for mice.

READ *et al.* (p. 838) have confirmed, by careful experiments under varied conditions, the value of the haemolysis test, first introduced by GREIG in 1914, for the differentiation of the true cholera vibrio from other similar vibrios, including the Celebes and El Tor strains. Greig-positive vibrios are defined as those which haemolyse goat erythrocytes during the first 24 hours of incubation; they belong to the "early haemolytic" group. Greig-negative vibrios belong to the "late haemolytic" group in that haemolysis is usually partial and never takes place within 24 hours; the haemolysin they contain is probably identical with the haemodigestive ferment described by VAN LOGHEM. In the late haemolytic group the haemolysis is partial, hardly occurs in 24 hours and is abolished when the test is performed at 12°C. or under restricted oxygen supply. Anti-haemolytic sera prepared from the Greig-positive organisms have a definite specific neutralizing effect on the haemolysins of the early haemolytic group; this is not so with the late haemolytic group.

READ and PANDIT (p. 159) record the results of a search for true cholera vibrios and for vibrios of the El Tor type in India. These do not accord with the findings made in Celebes. The true cholera vibrio, satisfying the criteria laid down for those of O group I by GARDNER and VENKATRAMAN, were found in all except one of the clinical cases of cholera, in 7 per cent. of close contacts of cases, and in 16 per cent. of sources of water in direct contact with the cases, but did not persist much longer than two weeks in any person or water. This vibrio, with one or two exceptions, was not found in the absence of the disease. The El Tor vibrio, on the other hand, was found usually in the absence of cholera, though occasionally with the disease, and was present in one area in which cholera had not appeared during the previous decade.

Although clinical cholera occurred some years ago in Celebes and was associated with a vibrio of the El Tor type, there is no evidence that such an association occurs in India.

VENKATRAMAN *et al.* (p. 160) have also taken up this question, with similar results. They place on record the repeated finding of the El Tor vibrio in open natural water sources in S. India in the complete absence of cholera.

VENKATRAMAN (p. 161) reports the recovery of 21 strains of agglutinable vibrios from sources of water (mainly tanks) in the Cauvery delta of Madras. Of these strains 20 were haemolytic on first isolation, but the haemolytic property varied considerably on later examination. An attempt is to be made to ascertain the significance of this type of vibrio in the epidemiology of cholera.

ANDERSON (p. 161) has failed in an attempt to bring about reversion of water vibrios to true *V. cholerae* by growing them in the presence of appropriate anti-phage serum. The basis of the experiment was the idea that water vibrios may have been produced from *V. cholerae* by the action of phage, and that the removal of phage might permit reversal. PASRICHA *et al.* (p. 162) discuss a choleraphage of new

type, which they designate type N. This is apparently the same as Bruce White's type LL, and acts only on *V. cholerae*, being inactive on the inagglutinable vibrios. In this respect it resembles type A. PASRICHA and PAUL (p. 162) record the presence of bacteriophages against the dysentery bacilli, *Bact. typhosum* and *V. cholerae* in soil down to the level of 3 feet below the surface.

Pathology.

BANERJEE (p. 162) has investigated the loss of chloride from the body in cholera. He found, in the average of a series of cases, that 9·7 gm. were lost through vomiting and 34·6 gm. from the bowel, in the course of 24 hours. There was, consequently, diminished excretion in the urine. These patients were receiving about 25 gm. daily by injection. The result of this loss is marked hypochloraemia accompanied, of course, by haemoconcentration, but the author claims that it is the hypochloraemia which is the major factor in producing retention of nitrogenous waste products and renal failure, since the introduction of even a small quantity of hypertonic saline brings about improvement in the azotaemia, whereas larger quantities of glucose solution do not. In cholera the acid-base balance of the body fluids is greatly disturbed, and for this the lack of chloride is held responsible; the "deficiency of the chloride anions in plasma interferes with the exchange of the bicarbonate anions from cells to plasma." For these reasons the author suggests the use of 5 per cent. solution of NaCl in treatment, but in this respect his work is still in the experimental stage.

The same author (p. 163) discusses further the causes of renal failure in cholera. There is a fall in systemic blood pressure, the arterial system being relatively empty and the venous system engorged, especially in the splanchnic area. This leads to stagnation in the capillaries, shown in the kidneys by congestion. This capillary failure, in conjunction with great loss of interstitial fluid and hypochloraemia, is responsible for the renal failure.

TOMB (pp. 163, 459), however, ascribes the renal failure in cholera to the irreparable damage caused to the kidneys by lack of oxygen consequent upon collapse. Tissue asphyxia of this kind should, therefore, be treated by administration of oxygen after preliminary restoration of the circulation by intravenous saline or saline with plasma.

ASHWORTH and ADAMS (p. 164) use the specific gravity of whole blood as the indicator of haemoconcentration, and have calculated the relationships between this and the haematocrit erythrocyte volume, haemoglobin content and number of erythrocytes. In shock, the protein concentration and the specific gravity of plasma were not found to be satisfactory indicators of haemoconcentration, since protein is lost from the circulating blood during the course of shock.

RUSSELL (p. 165) likens the condition in crush oedema to that which occurs in cholera. He states that in cholera secretion of urine may be restarted even after suppression lasting for 2 days. For the accompanying acidosis intravenous sodium bicarbonate may be given. Calcium should be included in the solution, and an excess of sodium avoided, but alkali must not be given after the urine has become alkaline.

GHOSH and MUKERJEE (p. 690) put forward the view that in cholera there may be autolysis of *Bact. coli* in the akaline contents of the intestine, and that the products of this autolysis may be absorbed and

may play a part in aggravation of symptoms. They have found that the sera of cholera patients more commonly contain agglutinins for autogenous *Bact. coli* than do controls, and this lends *prima facie* support to their view.

Treatment.

ALDRIDGE (p. 165) discusses the treatment of dehydration in infants, and his remarks are of interest in relation to cholera. In dehydration due to gastro-enteritis the chief aim of treatment is to replace water and salts. It is not necessary to provide specially for loss of bicarbonate because it is the replacement of the sodium ion which is required [but see Russell above]. Oliguria must be relieved, and for this glucose is given intravenously, but should be given with care, since its diuretic action may result in elimination of too much chloride or of too much water. The author argues against the administration of saline [but is not dealing actually with cholera; the saline treatment of cholera is sufficiently well established]. He points out that the routine transfusion of blood is not advisable because haemoconcentration already exists. In patients with haemoconcentration who require more drastic treatment than parenteral injections of crystalloids, plasma transfusion should be considered.

PASRICHA *et al.* p. 166 show that febrile reactions which may occur after intravenous injections of saline solutions are frequently due to pyrogenic substances, usually dissolved in the saline. These commonly are split proteins derived from bacteria. The authors give advice as to how saline can be prepared free from these substances, and point out that salines for intravenous use should be prepared, at a central source of supply, by persons skilled in the necessary technique. PANJA *et al.* (p. 839) noted that patients receiving hospital hypertonic saline were prone to rigors and pyrexia. They describe their method of preparing pyrogen-free saline, and found that with this the reactions were greatly reduced. Pyrogen-free saline can safely be administered to patients with high rectal temperature.

CHOPRA *et al.* (p. 459) have used sulphaguanidine in treatment; the dose given was 1·0 gm. initially and 0·5 gm. every 6 hours for 72 hours. The case mortality rate in a series of 218 patients was 3·21 per cent., against 6·38 per cent. in a series receiving saline infusions only. This dosage is low and with larger doses the drug may be more effective [it will be remembered (this *Bulletin*, 1942, Vol. 39, p. 329) that in acute bacillary dysentery in British troops the average dose was at times as high as 20 gm. per diem to an aggregate of 135 gm.]. Sulphaguanidine was not found to be toxic, and the patients receiving it passed fewer stools and required less intravenous saline than the controls.

On the other hand CARRUTHERS (p. 838) concludes, from an investigation in a group of patients treated with sulphaguanidine (0·1 gm. per kilo., followed by 0·05 gm. per kilo. every 4 hours), that this drug has no demonstrated value in the treatment of cholera. Salines were given in addition and the results were compared with those obtained in a control group.

GRIFFITTS (p. 764) has found that if *V. cholerae* is suspended in mucin and injected intraperitoneally in mice, a much smaller dose is lethal than if the vibrios are suspended in saline. He has used this technique in experiments on the protective action of the sulphonamides.

Whereas 90–100 per cent. of mice are usually killed by intraperitoneal injections of 500,000 living vibrios in mucin, it was found that after a single injection of sulphathiazole or sulphadiazine, 80–90 per cent. survived for 24 hours and 50 per cent. survived the 7-day test period. Succinyl sulphathiazole and sulphaguanidine protected when given intragastrically. In cultivation tests he found that sulphanilamide, sulphathiazole and sulphadiazine inhibited the growth of *V. cholerae*, whereas sulphaguanidine and succinyl sulphathiazole did not.

GOHAR (p. 161) makes the suggestion that potassium tellurite may be useful in the treatment of cholera, in view of its strong antibacterial action towards members of the *Bacterium* group of organisms, but in an editorial comment it is pointed out that the tellurites are extremely poisonous, and that though tellurium was at one time used in the treatment of syphilis, with good effect, it had to be abandoned on account of its toxicity.

Immunization.

PASRICHA *et al.* (p. 166) have found that only 37 per cent. of 200 samples of cholera vaccine passed both sterility and potency tests. It is known that autolysis may occur on keeping, and to overcome this the authors advise desiccation and re-suspension of the organisms in saline at the time of use. They found, moreover, that the antigens appear to be better preserved in the dry state than in suspension.

Referring to an outbreak in Yunnan Province, POLLITZER *et al.* (p. 159) show that among 80,000 persons inoculated against the disease there were 16 cases only, whereas among 120,000 not inoculated there were 308 cases. *Charles Wilcocks.*

MALARIA.

FIELD (J. W.). **Morphological Variation in *Plasmodium vivax* Grassi & Feletti, 1890.**—*Parasitology.* 1942. May. Vol. 34. No. 1. pp. 82–87. With 24 figs. on 1 plate. [15 refs.]

In this paper the author describes and figures two abnormalities in *Plasmodium vivax* infections. In one case, that of an elderly Cantonese, there was a very heavy infection, with over 100,000 parasites per cmm. of blood. With this heavy infection, however, there was little febrile response, for at no time did the temperature rise to 100°F. The parasites which were advanced in growth (trophozoites, schizonts, gametocytes) were typically *P. vivax*, but the ring forms were peculiar in that there was a marked tendency to multiple infections (four to eight rings per cell). This appearance was noted on one occasion only, and eight hours later the tendency had diminished while in 24 hours it had disappeared entirely.

The second case was that of an infant 16 days old. The infection may have been acquired from the mother. On the other hand it may have been the result of mosquito transmission. There was a heavy infection of a *P. vivax*-like parasite which differed from typical *P. vivax* in that the mature schizonts occupied only two-thirds of the red cells, were compact in form and produced, usually, from 8 to 14 merozoites. The infected cells, though heavily stippled, were less enlarged than in typical *P. vivax* infections, while they exhibited a

tendency to assume fimbriated outlines. The gametocytes were indistinguishable from those of *P. vivax*. It was not possible to study this case fully.

The various possibilities in the two cases are discussed and the previous records of similar appearances are reviewed. It is concluded that *P. vivax* under abnormal conditions is liable to exhibit abnormalities and that this is the explanation of the occurrence of the unusual forms in the two cases referred to. *C. M. Wenyon.*

ZUMPT (F.). Die Rassenfrage bei *Anopheles maculipennis* Meigen. I. Beitrag zum Problem der Artbildung und Artbegrenzung. [**The Question of Races in** *A. maculipennis*. **First Contribution to the Problem of Formation and Limitation of Species.**]—*Ztschr. Parasitenk.* 1941. Vol. 12. Pt. 3. pp. 372–387. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Aug. Vol. 30. Pt. 8. pp. 126–127.]

The author discusses the systematic status of the European Anophelines of the group of *Anopheles maculipennis*, Mg. At least seven of these have been distinguished, but it is not yet agreed whether they should be regarded as distinct species or as varieties or biotypes. They are *maculipennis* sens. strict. (*typicus*), *atroparvus*, van Thiel, *labranchiae*, Flni., *messeae*, Flni., *melanoon*, Hackett, *subalpinus*, Hackett & Lewis, and *sacharovi*, Favr. Still other forms occur outside Europe. Apart from *sacharovi*, which differs in the adult, these forms can be distinguished from one another only in the egg-stage, and an unpublished table by F. WEYER is given showing the distinguishing characters. Their geographical distribution is discussed from the literature, with special reference to those that occur in Germany, and the results of experiments on cross-breeding are reviewed. The author then summarises the main conclusions of DOBZHANSKY (1939) as to the factors leading to the differentiation of species. The external factors are geographical, ecological or temporal isolation of originally homogeneous groups, and the internal ones, which result from the former and may persist after their disappearance, are physiological modifications that hinder or prevent interbreeding between the individuals of different groups or render the offspring infertile. The forms of the *maculipennis* group, though only slightly differing from one another in morphology, have reached the stage of physiological differentiation, but instinctive isolation (lack of a mutual inclination to pair) plays a great part in this, since the production of fertile offspring by interbreeding is not yet excluded and doubtless occurs to some extent in nature. In view of the evident restrictions on interbreeding, however, the author considers that they should all be accorded specific rank and that in cases of doubtful identity a specimen should be recorded merely as belonging to the *maculipennis* group.

SCHWETZ (J.). Contribution à l'étude des anophélines du Congo oriental (Lac Kivu—Lac Albert). [**Additions to our Knowledge of the Anopheles of the Region round Lake Kivu and Lake Albert, Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1941. Mar. 31. Vol. 21. No. 1. pp. 17–35.

The author has paid several brief visits to the area round lakes Kivu and Albert in the extreme east of the Belgian Congo. It seems

that the whole of the area he studied lies above 4,500 ft. and much of the interest of his paper is in the facts which may be extracted from it relating to the altitude at which Anopheles occurs. It seems that *A. gambiae* is very infrequent and generally absent above 5,000 ft. At and above that altitude the commonest and most widely distributed species is *A. christyi*. The total number of species recorded is thirteen. It is, perhaps, disappointing that the author did not discover any species of Anopheles new to science in this remote and mountainous area. "*A. funestus*" is recorded without indication whether the identification is critical in the modern sense.

A large part of the paper consists of lists of species identified in particular stations. *P. A. Buxton.*

RUSSELL (Paul F.) & RAO (T. Ramachandra). **On the Swarming Mating, and Ovipositing Behavior of** *Anopheles culicifacies*.—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 417–427. With 3 figs. [14 refs.]

The authors refer to the paucity of observations on the nuptial dance and mating habits of Anopheles, a subject to which they have given much attention in the course of their investigations on *A. culifacies* in South India.

A large number of experiments under a great variety of conditions were carried out in small cages, but under all circumstances the mosquitoes failed to pair. A large out-door insectary was then built, 10 ft. high and 40 × 20 ft. In it a small mud hut capable of accommocating a calf and meteorological instruments was erected, and outside the hut a number of small pits were dug in the floor of the cage. On several different occasions when bred *Anopheles culicifacies* were liberated in the cage, large numbers of fertile eggs were found in the water in the pits. The swarming or nuptial dance was also observed. The first evidence that this is about to take place is that when the daylight is failing a single male performs dancing movements over a selected area in the floor of the cage, always over dry ground and not over a surface of water. Large numbers of males, even as many as a hundred, soon join together to perform the dancing movement which continues for many minutes, but as the light is now failing it is difficult to observe the conclusion of the ceremony. The actual entry of females into the swarm was not observed, but pairs were seen to fly out from it, even within a few seconds of the start of the dance. The great majority of these females had already taken a blood meal. The swarm was exceedingly compact, rarely exceeding 18 in. across horizontally and 1 ft. vertically. There is a very close relation between swarming and the illumination, but apparently none with other meteorological factors, except that swarming did not take place when the atmosphere was surcharged with moisture: in the swarm all the insects adopt the eastward position, *i.e.* they face away from the sunset.

A female which has fed and paired will lay eggs if she is confined in a small specimen tube, but under natural conditions she indulges in a particular dance, hovering a few inches above the surface of the water, and dropping eggs while in flight, as was shown by slipping a petri dish beneath the hovering female. This may occur at any time in the night but is apparently commonest in the early part. The authors suggest that it is because the females must hover a few inches over the

water that this species does not breed in water containing growing rice or grass a foot or so high.

The authors were able to maintain this species in continuous culture in their large insectary for several successive generations. The mortality among early stages was very high. *P. A. Buxton.*

RAO (V. Venkat), ROY (B. B.) & RAO (P. Jagannadha). **Observations on the Swarming and Pairing of** *A. sundaicus* **(Rodenwaldt) and** *A. subpictus* **(Grassi).**—*Jl. Malaria Inst. of India.* 1942. June. Vol. 4. No. 3. pp. 405–408.

The authors describe the swarming and pairing of two species of Anopheles, observed in nature in the neighbourhood of the Chilka Lake on the east coast of India. In this area *Anopheles sundaicus* is exceedingly abundant.

On two occasions during January the authors observed swarming and pairing over the platform of the railway station. On one occasion the swarm was about 10 ft. by 4 horizontally and 1 ft. deep and was estimated to contain some five thousand mosquitoes. On both occasions swarming took place very close to sunset, and on both occasions samples of mosquitoes removed from the swarm showed a large preponderance of *A. sundaicus* of both sexes, but also considerable numbers of males and females of *A. subpictus*. It seems that the *sundaicus* had come some two miles from the breeding place to swarm at the particular spot where the observations were made, a remarkable observation even though this species is known to have a considerable range of flight. *P. A. Buxton.*

MUMFORD (Edward Philpot). **Mosquitoes, Malaria and the War in the Pacific.**—*Jl. Trop. Med. & Hyg.* 1942. May 15. Vol. 45. No. 10. pp. 74–76. [25 refs.]

MANSON-BAHR (P. H.). **Malaria in Wartime.**—*Brit. Med. Jl.* 1942. Oct. 17 & 24. pp. 461–462; 489–491.

MURRAY (J. Elliot) & SHUTE (P. G.). **A Case of** *P. falciparum* **Malaria.**—*Lancet.* 1942. Sept. 26. pp. 365–366. With 1 chart.

The patient, invalided from West Africa, where he had been for nine months, was admitted to an English hospital. There was no previous history of malaria; he had taken quinine throughout his stay in West Africa. He had no fever on admission. There was pain, tenderness and hyperaesthesia over the caecal area and ascending colon. While at home on a week-end pass, he collapsed and had a rigor. An attack of malaria developed but at the height of the attack no malaria parasite could be found in the blood. A day later a single minute parasite was found after very prolonged search. A short course of mepacrine effected a complete cure. All abdominal signs and symptoms disappeared. *Norman White.*

MOHR (Werner). Herz-Gefässstörungen bei Malaria. [**Cardiac Lesions in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1940. Nov. Vol. 44. No. 11. pp. 521–531. With 9 figs.

The author's remarks are based on a study of 260 cases of malaria. Macroscopically, the changes are often so slight as to pass unrecognized. There may be some degree of dilatation without hypertrophy, the muscle being flabby. It is the microscopic changes which, by their multiplicity, lead to the grosser lesions. The finer capillaries being partially, in some cases completely, blocked by the accumulation of parasites, there results injury to the endothelium and absorption of the malaria toxin and at the same time malnutrition of the muscle tissue supplied by these choked capillaries; there are multiple small localized necroses and, in the mass, resultant softening of tissue and dilatation. In the early stages treatment will bring about restoration to normal, but, if it is neglected, permanent mischief may ensue, evidenced by the electro-cardiographic tracings. The dilatation may lead to relative valvular inadequacy and the toxin absorption to extrasystoles and irregular action of the auricles.

From the same causes, says the author, the aorta may also show dilatation. The changes in the rhythm of the heart beat, however, he refers to toxic action on the vasomotor centres. Sometimes the malaria infection may be, as it were, the last straw, the influence which makes evident a cardiac lesion which had till then been latent, compensated and unperceived. Several electro-cardiographic tracings are reproduced illustrating the author's points. *H. Harold Scott.*

KOPP (Israel). **Plasma Proteins in Therapeutic Fever.**—*Jl. Lab. & Clin. Med.* 1942. May. Vol. 27. No. 8. pp. 1054–1062. With 3 charts. [25 refs.]

This is a description of the changes in the plasma proteins of nine patients who were subjected to malaria infection, artificial fever, and typhoid vaccine fever, for treatment of syphilis of the central nervous system. Six patients were given *P. vivax* malaria only, by the intravenous injection of 3 to 4 cc. of malarial blood. One patient was given artificial fever and malaria; one patient tertian and quartan malaria and typhoid vaccine fever; and one patient typhoid vaccine fever only. Typhoid vaccine fever was induced by the intravenous injection of increasing doses of T.A.B. vaccine usually three times a week; one patient was given 11 such injections, another 16. Artificial fever was induced by the inductotherm and humidified air cabinet; body temperatures were raised to 105°–106° for two hours at each treatment: one patient received 14 such treatments within 38 days.

The onset of malarial fever was accompanied by a rapid, progressive and marked reduction of plasma albumin; the reduction ranged from 30 to 40 per cent. Globulin fluctuated considerably but showed no consistent trend. Fibrinogen fluctuated in a similar manner. Termination of the malarial fever by quinine was followed by a rapid return to normal plasma protein content.

Fever produced by either typhoid vaccine or the inductotherm caused only slight fluctuations in the plasma protein fractions.

The author considers that the infectious process *per se* is probably the most important factor in determining the reduction of the albumin fraction in malaria, by interfering with the synthesis of albumin in the

liver. The increase in globulin, which was more commonly observed in the malaria cases, may be accounted for in part by the destruction of red cells. *Norman White.*

DULANEY (Anna Dean), STRATMAN-THOMAS (Warren K.) & WARR (Otis S.). **The Diagnostic Value of Complement Fixation in Malaria.**—*Jl. Infect. Dis.* 1942. May–June. Vol. 70. No. 3. pp. 221–225.

The authors have previously reported the results obtained with complement fixation tests, chiefly on patients undergoing malaria therapy [this *Bulletin*, 1941, Vol. 38, p. 336]. It was shown that complement fixation is correlated closely with the presence or recent presence of malaria parasites in the peripheral blood. In most cases the antibody titre fell off rapidly after the administration of quinine to terminate the attack.

Further work to determine the value of the test is now reported. Sera of 675 persons have been tested; 317 patients with symptoms which warranted examination of the blood for malaria parasites; 170 patients suffering from febrile diseases of bacterial or protozoal nature, other than malaria; 188 symptom-free individuals. The *P. knowlesi* antigen, which was used in all cases, was prepared in a manner very similar to that first described by COGGESHALL and EATON [this *Bulletin*, 1939, Vol. 36, p. 404]. For routine tests 0·1 cc. of serum, 0·1 cc. of antigen and 2 units of complement were used. Incubation in a water-bath at 37°C. for one hour was followed by the addition of sheep red blood cells and 2 units of amboceptor. Readings were made after a second incubation of from 20 to 30 minutes.

Of the 125 patients whose blood harboured malaria parasites 102 (81·6 per cent.) gave a positive, 3 to 4 plus, reaction; 23 gave a negative reaction. About one-third of the subjects in both groups had received some anti-malarial treatment. Fifteen patients gave a positive complement fixation test at a time when the blood-film was negative. Malaria was ruled out as a diagnosis in 177 patients with negative blood-films and negative complement fixation tests. There was agreement between blood-film and complement fixation tests in 279 of the 317 patients (88 per cent.). Sera from patients suffering from leprosy, amoebic dysentery and Chagas's disease gave a high proportion of positive reactions. Only 2 of 45 sera from patients with acute febrile diseases gave positive reactions. There were 7 positive reactions among the 188 sera obtained from normal persons. Thus it was shown that complement fixation, using a *P. knowlesi* antigen, gives highly specific results; in the diagnosis of malaria it may prove useful as a supplementary test to blood film examination.

Norman White.

BOYD (Mark F.). **Criteria of Immunity and Susceptibility in Naturally Induced Vivax Malaria Infections.**—*Amer. Jl. Trop. Med.* 1942. May. Vol. 22. No. 3. pp. 217–226. With 12 figs.

Patients submitted to malaria therapy at the Florida State are cosmopolitan, and the white patients inoculated with *vivax* malaria show great variation in the character and duration of the infection they experience. This study relates to 388 white patients successfully inoculated by infected mosquitoes, between 1931 and 1941, with the McCoy strain of *P. vivax*. They include 162 patients who experienced

attacks without therapeutic interference or spontaneous remissions; 101 who had attacks with one or more spontaneous remissions but no therapeutic interference; 62 patients in whom therapeutic interference effected a permanent cessation of clinical activity; and 63 patients in whom therapeutic interference caused a temporary cessation of clinical activity. A further series of 69 patients includes those who failed to become infected in spite of inoculation by infected mosquitoes. In none of the 162 patients, who did not experience either natural or induced remissions, did the febrile attack last 70 days. Attacks in patients with spontaneous remissions lasted from 14 to 113 days; only 2 patients had attacks exceeding 100 days in duration. The duration of attack in the 63 patients with induced remissions varied from 27 to 407 days.

Adequate histories were unobtainable from most of the patients but the place of birth was ascertained for 207 patients whose attack of fever had not been interrupted. These were classified: (1) those born in Florida, Georgia and Alabama 134, (2) those born in other Southern States 23, (3) those born in the north and west of the United States 40, and (4) foreign born 10. Of these patients 6·0 per cent. were infected but had no clinical attacks; they were all born either in Florida, Georgia or Alabama. Attacks of 16 days' duration or less were experienced by 40 per cent. of patients from Florida, Georgia and Alabama; by 52 per cent. of patients from other Southern States; by 10 per cent. of those from the north and west of the United States, and by none of the foreign born. From other observations the author concludes that subclinical infections, and self-limited attacks of less than two weeks, occur in individuals with a previously acquired autochthonous immunity, homologous or heterologous to the strain used in inoculation.

"Patients with uninterrupted attacks exhibiting a gradually declining parasitemia and clinical attacks that may extend from at least two to twelve weeks in duration, are believed to be completely susceptible. The duration of the attack will vary with the rate of decline in the parasitemia, continuing until a post onset subclinical density, at somewhere from one to two thousand parasites per cubic millimeter of blood, is passed in the descent. The parasitemia in other patients may initially attain a density comparable to that observed in susceptibles, but after a few days at such levels, a rapid decline to submicroscopic levels ensues. The clinical attack ceases when the decline begins. In still others the mechanism which brings about the rapid decline checks the rise well before clinical levels are attained. The former course suggests the gradual activation of a partially sensitized immune mechanism, the latter the prompt activation of one fully sensitized." *Norman White.*

HASSELMANN (C. M.). Zum Mechanismus der Nebenwirkungen des Plasmochins und ueber dessen therapeutische Wirkungsgrenzen bei autochthoner Malaria in den Tropen. [**The Mechanism of the Incidental Effects of Plasmoquine (Pamaquin) and its Therapeutic Limitations in Autochthonous Malaria of the Tropics.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1940. June. Vol. 44. No. 6. pp. 275–281. With 1 fig. [Refs. in footnotes.]

This article is written mostly as a correction of one by STAUSS [this *Bulletin*, 1939, Vol. 36, p. 683], who had minimized the toxic effects

of atebrin and plasmoquine, and misquoted the author in the process. For these polemics the original should be consulted. Three cases are then described of patients in the Philippines who were given 0·6 gm. atebrin during two days and then 0·03 gm. plasmoquine daily for 5 days, most of the doses being intramuscular, and who later relapsed with subtertian malaria, although they had remained in a malaria-free district. These cases illustrate the fact that plasmoquine may fail to prevent relapse, in spite of the manufacturers' claims. It is stressed that the therapeutic effects of a drug may be very different, when it is tested in a cool European climate, on well-nourished patients, from those observed when it is applied to undernourished natives in the tropics. In the opinion of the author, quinine cannot be replaced by synthetic antimalarial compounds in tropical practice. For severe cases of malaria he gives quinine either by intramuscular or (less commonly) intravenous injection. *F. Hawking.*

PETER (F. M.). Erwiderung auf die Arbeit Hasselmann: "Zum Mechanismus der Nebenwirkungen des Plasmochins und ueber dessen therapeutische Wirkungsgrenzen bei autochthoner Malaria in den Tropen." [**Reply to Hasselmann's article "The Mechanism of the Incidental Effects of Plasmoquine and its Therapeutic Limitations in Autochthonous Malaria of the Tropics."**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1940. Dec. Vol. 44. No. 12. pp. 574–575.

The author writes to contradict HASSELMANN's polemic against an original paper by STAUSS [see above]. Hasselmann described three cases of subtertian malaria relapsing after a short course of atebrin and plasmoquine, and concluded that plasmoquine is unable to prevent relapses in this condition. Peter criticizes the treatment used and disagrees with the conclusions. No new evidence is presented but there is a short review of the literature dealing with plasmoquine and atebrin. *F. Hawking.*

VIDELA (Carlos A.). Esplenomegalias palúdicas crónicas. Tratamiento por el cloruro de calcio. [**Chronic Malarial Splenomegaly. Treatment with Calcium Chloride.**]—*Guatemala Méd.* 1941. Dec. Vol. 6. No. 12. p. 18.

The author refers to the Ascoli treatment but suggests the following method, which he has found successful in cases of benign tertian disease with chronic splenomegaly. After quinine treatment, or in the period of full apyrexia, intravenous injections of 10 per cent. solution of calcium chloride, in doses of 10 cc., are given daily or on alternate days to a total of 5 injections. Contraction of the spleen is observed within ½ hour of the injection and increases up to 1 hour, but the contraction passes off partially, leaving, at the end of two hours, the spleen permanently reduced to an appreciable extent. Further reduction takes place on successive injections, and splenic pain disappears. These reductions are held to be due to augmentation of splenic tone due to the vaso-constriction induced by the drug. *C. W.*

MOHR (W.). Vitamin C-Stoffwechsel und Malaria. [**Malaria and Assimilation of Vitamin C.**]—*Deut. Trop. Ztschr.* 1941. July 1. Vol. 45. No. 13. pp. 404–405.

ZSCHUCKE in 1940 recorded his investigations on vitamin metabolism in natives of West Africa, and in particular that of vitamin C in four

cases of malaria. He came to the conclusion that, whereas in Europe a definite connexion was observed between deficiency of vitamin C and certain diseases such as gingivitis, the healing of skin lesions, etc., in West Africa this connexion could not be established. He found that, though in lobar pneumonia and malaria there was increased consumption of vitamin C, he could not find any causal connexion between these conditions and deficiency of the vitamin.

The author, working with KÜHNER in 1939, found that in the course of an attack of malaria—seen in a case of inoculated disease—there was an increased demand for and use of vitamin C, an increase of 47–60 mgm. *per diem*. Further, in malarious sailors returning from a voyage to Africa, more than the usual amount of the vitamin was needed.

Investigating next the influence of vitamin C on restoration of the blood picture to normal in convalescence from malaria, he found that additional vitamin brought about a better and quicker regeneration from malarial anaemia, the reticulocyte count increased, as did also the haemoglobin. Again, the author affirms that he could determine no causal connexion between malaria and avitaminosis C; the significance of the vitamin lies in the bringing about improvement in the convalescent stage and in enhancing the value of iron. The combination of iron (10 pills of "Ferrostabil" daily) with ascorbic acid (0·25 gm., as Canthan, Cebion, Redoxon) or in the form of "ascorbic acid iron" (Ferro 66) was given with much success in malarial anaemia.

The author lays stress on a fact, which is obvious from the foregoing, that this has nothing to do with the proper treatment of the malaria itself by quinine, atebrin, plasmoquine, etc., but that, together with this specific therapy, more vitamin C is called for, either by adding the vitamin itself or by giving a diet rich in this vitamin.

H. Harold Scott.

MENK (W.). Die Malaria als Volkskrankheit im europäischen Russland und ihre Bekämpfung. [**Malaria and its Control in European Russia.**]—*Deut. Trop. Ztschr.* 1942. July 1. Vol. 46. No. 13. pp. 239–253. [12 refs.]

RUSSELL (Paul F.), KNIPE (Fred W.) & RAO (T. Ramachandra). **A Water Emulsion of Pyrethrum Extract for Spray-Killing Adult Mosquitoes.**—*Indian Med. Gaz.* 1942. Aug. Vol. 77. No. 8. pp. 477–479.

It is now well established that transmission of malaria can be interrupted if the resting places of the vectors are effectively sprayed at suitable intervals. The spray generally used is an extract of Pyrethrum in kerosene. In this paper the authors report the successful use of an aqueous emulsion of Pyrethrum extract, the total cost of which was only one-sixth to one-third of the kerosene spray (Pyrocide 20, 1 : 19 mixture with kerosene) generally used in India. Twenty pounds of Indian grown Pyrethrum flowers were extracted with 12 gallons of kerosene, yielding 10 gallons of stock extract. On the day of use one gallon of this extract was diluted with three gallons or seven gallons of water in the presence of an emulsifier. (Rather better results were obtained with the stronger emulsion). Two emulsifiers were found satisfactory: "Gardinol" (sodium lauryl sulphate) at the rate of 23 gm. per gallon of emulsion and "Perminal EML" at the rate of one-third of a pound per gallon of emulsion. Very good results were

obtained in a spray testing chamber and in village houses in Madras. Owing to the slightly heavier droplets discharged by the nozzle of the spray-gun when water is used it may be necessary to use slightly greater amounts of material. *V. B. Wigglesworth.*

POGODINA (E. A.) & SOKOLOV (A. G.). [**Alkaloidal Fogs for combating Mosquitoes.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 1–2. [In Russian pp. 109–111.] [Summary taken from *Public Health Engineering Abstr.* Washington. 1942. Aug. Vol. 22. No. 8. p. 14. Initialled D. M. M.]

"The effects of aerosols of anabasine sulfate and anabasine base on Anopheles mosquitoes were investigated by evaporating anabasine either by outside heating ('evapn. method') or by heating from an exothermal reaction, such as slaking lime ('lime method'). In the lime method the following reactions take place on pouring an aq. anabasine sulfate soln. over unslaked lime $CaO+H_2O \rightarrow Ca(OH)_2+15{\cdot}5$ kg.-cal., $Ca(OH)_2+(C_{10}H_{14}N_2)_2{\cdot}H_2SO_4 \rightarrow 2C_{10}H_{14}N_2+CaSO_4+2H_2O$, anabasine (liquid) → anabasine (vapor) → 1452 kg.-cal. and condensation of a part of the anabasine vapors during cooling in air with the formation of colloidal-size particles (fog). The mosquitoes were very sensitive to anabasine sols. The min. lethal dose which was 100% effective against mosquitoes was 0·2 g. of anabasine per cu. m. of air. The sol possesses an unpleasant specific odor, producing coughing. Under summer conditions the sol is dispersed rapidly and no odor remains after 15–20 min. To accelerate the reaction at low temps. the mixt. must be heated or some dry lime added to the mixt. to which some 20% H_2SO_4 is added. In the 'evapn. method' heat some sand to 300–50° and place anabasine base (1·5–2·0 g./cu. m.) or alk. anabasine sulfate (5–6 g./cu. m.) on the sand. A 100% effectiveness against mosquitoes from the evapn. method was also obtained. The sol had no harmful effect on rabbits and hens, on the germinating properties of seeds or on food products. Both methods are also suitable when nicotine is used as the insecticide." [See also this *Bulletin*, 1938, Vol. 35, p. 512, 1941, Vol. 38, p. 510.]

ROBERTSON (J. L.), Jr., LE PRINCE (J. A.), JOHNSON (H. A.) & PARKER (W. V.). **Observations on Experimental Malaria Control Drainage Ditch Linings.**—*Public Health Rep.* 1942. Mar. 27. Vol. 57. No. 13. pp. 451–463. With 14 figs. on 8 plates.

Much ditch lining work has been done in the city of Memphis and in Shelby County, Tennessee, as a mosquito control measure, with the object of determining what form of lining can be constructed at minimum cost with due regard to durability. Simplicity in construction methods is a further desideratum. Monolithic concrete linings, linings of brick, and of precast concrete slabs were tried. Methods of construction are described in detail, and constructional costs are given. Most of the ditches selected for study were typical field ditches three to four feet deep. The linings were made to cover the invert of the ditch and to extend up the banks a few inches above the observed erosion line. The banks were sloped 1½ to 1. After installation of the lining the banks were sodded with Bermuda grass sod. Cross section of a lining in a ditch three feet deep is shaped like the arc of a

circle with a radius 1·25 feet, the chord measuring 2 feet and the arc 2·5 feet; the depth of this invert is six inches. A slab thickness of 2 to 2½ inches is the minimum which should be employed.

The advantages and disadvantages of each method of construction are discussed at length. Even the poorest of ditch linings are giving good service, and apparently will continue to do so for a considerable period of time.

The paper is concerned exclusively with the engineering aspects of this important mosquito control measure. *Norman White.*

DAVID (W. A. L.). **Simple Tests for estimating the Suitability of Mineral Oils as Mosquito Larvicides.**—*Bull. Entom. Res.* 1942. Sept. Vol. 33. Pt. 3. pp. 195–203.

This paper should prove very helpful to those who have to judge the suitability of a larvicidal oil or to prepare a suitable blend of oils without access to a well-equipped laboratory. The author lays down a specification under the following headings: specific gravity (should not exceed 0·950 at 15°C./4°C.); volatility (not more than 5 per cent. should distil over at 200°C.): viscosity (not greater than 52 sec. Redwood I at 70°F.); spreading pressure (not less than 16 dynes per cm.); permanence of film (should remain uniform and unbroken for at least two hours); toxicity test (at least 50 per cent. *Aëdes aegypti* larvae or 90 per cent. *Anopheles maculipennis* larvae should be killed when exposed under a film 10μ thick for half an hour at 25°C. and then kept in clean water for 24 hours). A simple procedure for testing all these points with the minimum of apparatus is set out in detail. It is not possible to summarize this usefully. There follow two appendices; one on the procedure to adopt in blending larvicides, that is, the choosing of suitable kerosene, diesel oil and fuel oils and deciding what proportions of each to employ; and lastly an appendix which reviews briefly the nature of petroleum products for the benefit of those quite unfamiliar with petroleum technology. *V. B. Wigglesworth.*

HOWARD (Ralph S.), Jr. & ANDREWS (Justin). **Studies on the Concentration and Distribution of Paris-Green-Lime Mixtures Applied as Anopheline Larvicides.**—*Amer. Jl. Trop. Med.* 1942. May. Vol. 22. No. 3. pp. 283–293. With 2 figs. & 1 chart.

In the experiments described, "high calcium, air-floated, chemical hydrated lime" was used as the diluent of Paris green, and the mixture was distributed by a hand-operated duster of the rotary-fan blower type, and by a power duster, driven by a truck motor. It was found that Paris green settles out faster and at shorter distances from the duster than does the lime. The extent of the visible dust-cloud is therefore no measure of the surface of the water being treated with the larvicide. With the hand blower high mortality of the larvae was restricted to some 200 feet from the duster though the dust cloud could be seen extending to double that distance. With power dusters the larvicidal range is very much greater but is still not coextensive with the limits of the visible dust cloud. The observations indicate the desirability of having a diluent whose density and behaviour in aerial suspension are more nearly akin to those of Paris green than lime. Pure Paris green would be difficult to apply uniformly at a pound or less an acre. Regular coverage is difficult to obtain with less than three pounds of dust per acre. *Norman White.*

HINMAN (E. Harold), CROWELL (R. L.) & HURLBUT (Herbert S.). **Studies on Copper Arsenite, a New Anopheline Larvicide.**—*Amer. Jl. Trop. Med.* 1942. May. Vol. 22. No. 3. pp. 271–281.

Larvicidal dusting by aeroplane has been extensively used in the Tennessee Valley Authority's malaria control programme. Cost records during 1937 showed that the average cost of application per acre was 37 cents, of which nearly two-thirds was the cost of Paris green. This prompted endeavours to find a cheaper and more effective larvicide than Paris green. This paper describes the work that has been done to this end. Laboratory experiments were made comparing the larvicidal action of a large number of arsenites of different metals. These showed that copper arsenite has a marked superiority over Paris green, notably for first instar anopheline larvae. A sufficient quantity of this was manufactured for field testing by aeroplane dusting. These field experiments showed that copper arsenite is at least as efficient as Paris green in spite of the fact that only a small proportion of the arsenite dropped reached the water surface. Laboratory experiments showed that the size of the particles of the larvicide is of importance; particles which average 5 or 15 microns in diameter are more efficient than particles averaging 25 microns. The copper arsenite used in the field experiments was of uniformly fine particle size; this may in part explain the favourable results obtained. Both Paris green and copper arsenite may be diluted 1 : 19 with soapstone without loss of larvicidal efficiency.

Norman White.

BISHOP (Ann). **Chemotherapy and Avian Malaria.**—*Parasitology.* 1942. May. Vol. 34. No. 1. pp. 1–54. [186 refs.]

Of recent years avian malaria has occupied an important place in investigations on malaria. Not the least of these has been the part played by it in the establishment of the comparative therapeutic value of the various alkaloids obtainable from cinchona bark and the search for new antimalaria remedies. Already several important discoveries have been made, and atebrin and plasmoquine stand out as the principal additions to our remedies against malaria. So far no true prophylactic has been discovered, but investigations directed to this end are constantly in progress. In this most interesting paper the author traces step by step the part played by avian malaria in these developments. She discusses the technique employed and evaluates the results obtained. The whole is a valuable summary of our knowledge of this most important subject, and every investigator in this field should make a point of carefully studying it.

C. M. Wenyon.

RUSSELL (Paul F.) & MOHAN (Badri Nath). **Some Mosquito Hosts to Avian Plasmodia with Special Reference to** *Plasmodium gallinaceum.*—*Jl. Parasitology.* 1942. Apr. Vol. 28. No. 2. pp. 127–129. [11 refs.]

TRYPANOSOMIASIS.

CAMPOURCY. Recherches sur l'infection de *Glossina palpalis* par *Trypanosoma gambiense* au Cameroun. [**Investigations on the Infection of *G. palpalis* with *T. gambiense* in the Cameroons.**]—*Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* Brazzaville. 1942. July. Vol. 1. No. 1. pp. 59–75. With 7 figs.

An account is given of the results of recent surveys carried out in the French Cameroons with the object of determining the incidence of human trypanosomiasis, with special reference to the infection rate of tsetse (*G. palpalis*) in the endemic areas.

In the neighbourhood of Yaoundé, out of 500 flies 13 (2·6 per cent.) proved to be infected, only two showing trypanosomes in the salivary glands. In Leboudi, Ahalla, N'Simeyong and N'Kolbisson 9,440 natives were examined and 518 found infected. The total number of flies examined in these areas was 666, 31 (4·65 per cent.) of which, including four with gland infections, were positive. Sleeping sickness was also reported from other districts (Lebanzip, Efok, Obala) but no infected flies could be found there. These surveys have thus established an extremely low infection rate in the vector.

The author describes a simplified method of dissection of tsetse flies for the detection of trypanosomes. The proboscis is first removed with a needle inserted into the bulb. The fly is placed on its back and two lateral incisions are made at the junction of thorax and abdomen. With one needle resting on the thorax and a second one on the abdomen, these parts are drawn 1 cm. apart. This operation exposes the salivary glands and gut. The glands are then removed with a needle, a portion of the gut is excised, and both are examined microscopically. For more rapid diagnosis the abdomen is simply cut in two and smears are made with the exposed intestinal contents.

C. A. Hoare.

TROLLI (G.) & VAN WYMEERSCH. La trypanosomiase humaine au Chenal et au Kwango. Diagnostic par l'examen du sang en goutte épaisse colorée. [**Human Trypanosomiasis in Chenal and Kwango : Diagnosis by Stained Thick Blood Film.**]—*Ann. Soc. Belge de Méd. Trop.* 1941. Sept. 30. Vol. 21. No. 3. pp. 231–259. [21 refs.]

The authors claim that the examination of blood by the Giemsa-stained thick drop is a more accurate method of detecting *T. gambiense* infection than that of gland puncture. It has in addition the advantage of allowing examination of slides at leisure, and gives information about the malaria parasite rate. They support this contention by the following figures : Out of 8,846 natives examined, 570 were found to be infected by trypanosomes. Of these 212 were diagnosed by gland puncture alone, 276 by the thick drop alone, 80 were positive by both methods, and also 1 by lumbar puncture and 1 by blood culture.

In one region, the so-called Channel of the Congo River above Stanley Pool, where the infection was apparently recent, 31 subjects were positive to gland puncture, while 83 showed trypanosomes by the thick drop method.

It is claimed that at least 50 per cent. of the cases with positive gland puncture show positive bloods, so that more than twice as many positives are diagnosed by a single blood test than by a single gland puncture.

In the discussion RODHAIN pointed out that this method may be more accurate in epidemics, but that a single blood test may only reveal two-thirds of the actual positive cases. *C. C. Chesterman.*

DAVID & PAPE. Deux cas d'hérédo-trypanosomiase. [**Two Cases of Hereditary Trypanosomiasis.**]—*Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* Brazzaville. 1942. July. Vol. 1. No. 1. pp. 92–94.

The authors record, from the French Cameroons, two cases of congenital trypanosomiasis, said to be the first in which transplacental transmission has been established beyond doubt. In both cases the mothers (native women) were in excellent health and showed no evidence of trypanosomiasis before parturition. Immediately after delivery routine examinations of the blood revealed the presence of trypanosomes in the peripheral circulation of the mothers and of the two infants, as well as in the umbilical cords. The trypanosomes persisted in the mothers and infants for a period of one week in one case and a fortnight in the other, after which the patients underwent treatment resulting in the disappearance of the trypanosomes. All the available evidence in these cases seemed to point to transplacental transmission of the infection. *C. A. Hoare.*

FULTON (J. D.) & YORKE (Warrington). **Studies in Chemotherapy. XXX.—The Trypanocidal Action of Additional Aromatic Diamidines.**—*Ann. Trop. Med. & Parasit.* 1942. Sept. 30. Vol. 36. No. 3. pp. 131–133.

A description is given of the therapeutic action of various new aromatic diamidine compounds on infections of mice by *T. congolense* and *T. rhodesiense*. The details of the two most active compounds are as follows :—

(1) 4 : 4′-diamidino monomethyl stilbene. Maximum tolerated dose (intraperitoneal) per 20 gm. mouse, 1·0 mgm. ; minimum effective dose, 0·01 mgm., and minimum curative dose, 0·05 mgm. for *T. rhodesiense* infections ; M.E.D. 0·5 mgm. and M.C.D. 1·0 mgm. for *T. congolense* infections.

(2) 4 : 4′-diamidino dimethyl stilbene, M.T.D. 1·0 mgm., M.E.D. 0·025 mgm. (0·05 mgm. cured 5 out of 10 mice) for *T. rhodesiense* infections ; and M.E.D. 0·1 mgm., and M.C.D. 0·25 to 0·5 mgm. for *T. congolense* infections.

The compounds were not active against *T. cruzi* infections of mice. *F. Hawking.*

DUBOIS (A.) & KOHN (I.). Infectiosité de trypanosomes au cours de traitements chimiothérapiques. [**Infectivity of Trypanosomes during Chemotherapeutic Treatment.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. June 30. Vol. 20. No. 2. pp. 173–178.

Mice infected with *T. brucei* were treated with various drugs, and before the trypanosomes had disappeared from the blood, inoculations

were made into other mice. Trypanosomes thus exposed to suramin (Bayer 205) failed to infect fresh animals, those exposed to neoarsphenamine or to novoflavine (? acriflavine) often failed to infect, those exposed to tartar emetic, tryparsamide, or human serum always infected. The authors draw no conclusions from these observations. [The power of suramin to render trypanosomes non-infective is well known, although they are not killed by it *in vitro*. In the case of the other compounds, the authors' observations presumably relate to the short period which elapses between fixation by the parasite of a lethal dose of the drug and their actual death.] *F. Hawking.*

KING (Harold) & STRANGEWAYS (Winifred I.). **Some Observations on the Relation between Chemical Structure and Drug-Resistance among Arsenicals.**—*Ann. Trop. Med. & Parasit.* 1942. June 30. Vol. 36. Nos. 1 & 2. pp. 47–53. [17 refs.]

This paper describes a study of the relations between the chemical structure of various trivalent arsenical compounds and their action *in vitro* upon normal and tryparsamide-resistant trypanosomes (*T. rhodesiense*). According to their actions, the compounds can be divided into three classes :—

(1) Those which contain solubilizing carboxyl groups and form neutral sodium salts with a great affinity for water, *e.g.*, 4-carboxyphenyl arsenoxide. These compounds are of low toxicity to the trypanosomes, normal and resistant (the dilution fatal in 6 hours is 1 in 800,000) and it is considered that these compounds enter the trypanosomes in the same way as glucose and salts. This class includes the arsenoxide corresponding to arsenophenyl-glycine, and, therefore, there is no need to postulate special "acetico-receptors" to account for the abnormal behaviour of this compound.

(2) Those which are devoid of hydrophilic groups, apart from the arsenoxide group, *e.g.*, phenyl arsenoxide and xylyl arsenoxide. They are actively trypanocidal for both normal and resistant trypanosomes. (the dilution of phenyl arsenoxide fatal in 6 hours is 1 in 320,000,000 to 1 in 640,000,000. It is believed that these substances are taken up at some lipoid-water interface, so that the phenyl group is in the lipoid phase and the arsenoxide group at the water interface.

(3) Those substances which act on resistant trypanosomes much less readily than on normal ones, *e.g.*, thioarsenite derivatives of tryparsamide arsenoxide, of which the lethal dilution at 6 hours is 1 in 13,000,000 for normal, and 1 in 400,000 for resistant trypanosomes. These compounds are taken up by the same groups in the parasite as those which take up oxazine and acridine dyes, but the nature of these groups is obscure. It appears that both ends of the molecule are involved in the primary fixation which occurs, since phenyl-*pp'* diarsenoxide, OAs ⬡ AsO, belongs to this third class and not to the second.

It must be understood that this division of the substances into three classes and the hypotheses concerning their mode of entry into the trypanosome refer only to the primary fixation of the compound by the organism. The later stages by which the compound causes death of the trypanosome are unknown, although possibly -SH groups may be involved. *F. Hawking.*

COLLIER (H. O. J.), FULTON (J. D.) & INNES (J. R. M.). **The Oedema of Mice Infected with *Trypanosoma cruzi*, and the Accompanying Pathological Lesions.**—*Ann. Trop. Med. & Parasit.* 1942. Sept. 30. Vol. 36. No. 3. pp. 137–150. With 1 chart & 12 figs. on 2 plates. [26 refs.]

This is the most complete account of the pathology of experimental American trypanosomiasis known to the abstracter and, as aiding in explaining the clinical symptoms in man, deserves a full description.

The authors set out to study and, if possible, to solve two main problems: (1) The widespread oedema (Chagas's myxoedema) occurring in this disease. (2) Comparison of the pathology of experimental infection of mice with *T. cruzi* with that of the natural disease in man and of other forms of trypanosomiasis in man and lower animals. Further questions arising from the former of these were: (i) What relation, if any, is there between this oedema and disturbance of the thyroid gland? (ii) Is it peculiar to mice or does it occur in other animals infected experimentally? (iii) Is it localized and related to the site of inoculation?

Previous experimental work has been mostly in connexion with the virulence of the trypanosome, its infectivity and mode of transmission. From the pathological aspect several writers, CROWELL, DE COURSEY, JOHNSON and DE RIVAS, and LENDEBERG among others, have concluded that the presence of the trypanosome evokes an exudative inflammation followed later, in the more chronic stages, by proliferative changes.

The authors have inoculated more than 250 mice in the course of their investigations and examinations were carried out at different intervals after inoculation—when the blood infection was at its acme, and before, during and after development of the oedema. The results are classified in four stages: (1) A negative blood phase (after intravenous inoculation the parasites are found immediately; the negative phase refers to inoculation by other routes). (2) Progressive infection. (3) Acute pathological changes taking place. (4) Fading blood infection. The "oedema" occurs in the third of these, about the 15th day, and extends over the neck, chest and abdomen, is of a clear, gelatinous type, spreading along the fascial planes into the upper limb muscles and around the cervical, axillary and iliac lymph nodes, which are much swollen. The exudate from the deposit may contain more trypanosomes than are seen in the peripheral blood; the spleen is enlarged and engorged, the liver shows little change, the kidneys, alimentary tract and genitalia nothing abnormal; in particular the thyroid, microscopically as well as macroscopically, appears to be normal. Mice not exhibiting this oedema showed the other changes described, so the difference is probably one of degree only.

Histologically, the oedema is seen to separate the dermis from the muscular layers of the skin; the subcutaneous tissue is of loose areolar structure, the spaces of which are occupied by gelatinous transudate; the cells are mainly lymphocytes and large swollen histiocytes. The lymph nodes show proliferation and shedding of the cells lining the sinuses; these are distended by masses of free histiocytes which may obstruct the flow of lymph and lead to the production of small medullary cysts. Necrosis and haemorrhage are absent. The oedema spreads through and separates the voluntary muscle fibres, the fibres themselves showing loss of striation and poor staining. Parasites may

be numerous in the fibres and there may be some inflammatory reaction; in other places the parasites did not seem to evoke any such reaction. The myocardium showed similar changes to those of the voluntary muscles, particularly in the atria, the atrio-ventricular junction, base of the ventricles and the walls of the large veins. Other viscera showed no marked alterations from the normal. Mice which had lived for 6–12 weeks, and in which the oedema had passed away showed none of the acute changes as seen previously in the muscles and heart, but residual scars and areas of calcification. In those showing the acute changes leishmanoid forms of the parasite could be seen in heart, spleen (scanty), liver, pancreas, kidneys (scanty), testis, skeletal muscles, tongue, salivary glands, lymph nodes, skin and subcutaneous tissue, *not in the thyroid*, therefore the oedema is not a "myxoedema," but comparable rather with an inflammatory oedema such as is met with in bacterial, virus and protozoal conditions other than trypanosomal.

As regards the second main question, the oedema does not occur, say the authors, in other trypanosomal infections of mice, such as with *T. gambiense* and *T. congolense*, nor did adult rats, hamsters, guineapigs, monkeys, rabbits and other laboratory animals show the oedema even after inoculation with *T. cruzi*.

Transient oedemas are well known as occurring in the early stages of African trypanosomiasis of man and animals, and in surra, dourine, "mal de caderas," but *T. cruzi* infection produces the oedema which is the subject of this paper only in those animals to which the protozoon is truly pathogenic, namely man, dog and mouse. *H. Harold Scott.*

MAZZA (Salvador), BASSO (Germinal) & BASSO (Redento). Investigaciones sobre enfermedad de Chagas. Ensayos terapéuticos del producto 9736 (As) Bayer y de su acción comparada con el 7602 (Ac) Bayer en la enfermedad de Chagas. [**Chagas's Disease. Treatment with 9736 (As) Bayer compared with 7602 (Ac).**]—*Universidad Buenos Aires: Misión de Estudios de Patologia Regional Argentina (Jujuy). Publicación No. 61.* 1942. 76 pp. With 60 figs.

Bayer 7602 (Ac) has been used in treating cases of Chagas's disease for the past five years with good success; it is injected intramuscularly. In some patients the injections cause much pain, and in some the onset of albuminuria necessitates stopping the treatment for a time and then resuming with reduced doses. In 1940 Bayer produced another arsenical, denominated 9736 (As), which contains 22 per cent. arsenic and 5 per cent. sulphur, and is used in 10 per cent. solution intravenously. It is less toxic and better tolerated than 7602. The usual dosage is 1·5 cc. (0·15 gm.) for adults (less for children and debilitated subjects), increasing to 3·0 and even to 4·5 cc., twice or thrice weekly to a maximum total of 50 cc. (5 gm.) for men, 40 cc. for women, and 30 cc. for children.

Four cases are recorded with Professor Mazza's usual wealth of detail. Two were women of 16 years, treated with 7602 (Ac) and two women of 29 and 15 years who received the new drug. The latter tolerated the drug well, but the 7602 is more effective and more rapid in action. The new preparation has, however, the advantage of acting also on other trypanosomes—*T. brucei, T. gambiense, T. rhodesiense, T. congolense,*

T. evansi and *T. equinum*, at least in experimental infections, whereas 7602 (Ac) is trypanocidal in the case of *T. cruzi* only.

H. Harold Scott.

LEISHMANIASIS.

BOIX BARRIOS (Jose). Epidemiologia del kala-azar infantil. [**Epidemiology of Infantile Kala Azar.**]—*Medicina Española.* Valencia. 1942. Mar. & Apr. Vol. 7. Nos. 38 & 39. pp. 220–231 ; 352–362. With 3 maps & 1 chart.

This is a general account of infantile kala azar, having special reference to cases which have been observed in Spain, where the disease is most prevalent on the Mediterranean coast and in and around Madrid. In one coastal province, Castellón, 507 cases have been reported, while in the province of Madrid 132 cases have been noted. The incidence of the disease as regards age, sex, seasonal occurrence and other features is characteristic of Mediterranean kala azar. It is admitted that of domestic animals dogs are the most important reservoirs, but attention is called to the observation of BENAVENTE that there is some association between outbreaks of illness amongst fowls and the occurrence of human cases. [No one, however, has yet been able to show that fowls are liable to leishmania infection.]

C. M. Wenyon.

INDIAN MEDICAL GAZETTE. 1942. Aug. Vol. 77. No. 8. pp. 483–485. —**The Transmission of Kala-Azar.**

FULTON (J. D.) & YORKE (Warrington). **Studies in Chemotherapy. XXXI.—The Increased Toxicity of Old Solutions of Stilbamidine.**—*Ann. Trop. Med. & Parasit.* 1942. Sept. 30. Vol. 36. No. 3. pp. 134–137.

Experiences in the laboratory at Liverpool and in the hospitals of the Sudan suggested that solutions of stilbamidine (4 : 4′-diamidino stilbene) might become more toxic on ageing.

This compound was originally issued as the dihydrochloride, but recently this has been replaced by the di-isethionate salt which is much more soluble. Experiments were made to determine the toxicity, for mice, of a single dose given intraperitoneally. No change was produced by heating the solution to 60°C. for 5 minutes, by boiling for two minutes, or by keeping at 15–20°C., or for 14 days in the dark. But if the solutions were exposed to sunlight on the window sill [the atmosphere of Liverpool is smoky] for two days, the solution became slightly yellow and the toxicity was considerably increased, for instance the M.T.D. of the di-isethionate was reduced from 2 mgm. per 20 gm. mouse to about 0·25 mgm. and that of the dihydrochloride from 1 mgm. to less than 0·25 mgm. If the exposure to sunlight was prolonged for more than 14 days, no further increase of toxicity occurred. The mice which died, usually did so within a few minutes after the intraperitoneal injection ; their death may have been due to fall of blood pressure, which is known to occur after the injection of diamidines. On the other hand, the toxic symptoms in patients in the Sudan did not develop for some time after the completion of the

course, and they suggested degeneration of the liver and possibly of other organs, resulting from a cumulative toxic action of the drug. These compounds are known to cause fatty degeneration of the liver in dogs and cattle and peculiar nervous symptoms have been produced in dogs. Owing to the different symptoms observed in mice and in man or large animals, it is not yet certain whether the increased toxicity of old solutions for the latter is also due to changes produced by light. The chief practical conclusion to be drawn from this work is that during the treatment of man or animals, only freshly prepared solutions should be used.

[SMILES and the reviewer (this *Bulletin*, 1942, Vol. 39, p. 238) found that solutions of diamidino-stilbene are strongly fluorescent when exposed to ultraviolet light : on continued exposure, the brilliance of the fluorescence gradually diminishes. Thus it is clear that the compound absorbs energy from the rays of light and that it undergoes some molecular change as a result.] *F. Hawking.*

LATYSHEV (N. I.) & KRIUKOVA (A. P.). **On the Epidemiology of the Cutaneous Leishmaniosis. The Cutaneous Leishmaniosis as a Zoonotic Disease of Wild Rodents in Turkmenia.**—*Travaux Acad. Milit. Méd. Armée Rouge U.R.S.S.* Moscow. 1941. Vol. 25. [In Russian pp. 229–241. With 12 figs. (2 on 1 plate). English summary pp. 241–242.]

" The authors have found that in the sand desert conditions of the investigated regions of Turkmenia (valley of the Murgab River) the burrows of wild rodents appear to be breeding places for Phlebotomus. Determining the great susceptibility of *Rhombomys opimus* to the infection with *L. tropica* taken from man's ulcers, within a very short period of incubation (from 7–12 days), the authors have carried out a wide investigation of these rodents, searching for a spontaneous infection in them.

" The searches have proved successful, on the average 30 per cent. of 1,087 animals have been found to be spontaneously infected with leishmaniasis ; the number of infected animals increasing during the season from 2·3 per cent. in May to 56·3 per cent. in November–December. The clinical findings of the infection in rodents have already been described.

" The identity of the parasite of Rhombomys with that of human *L. tropica* is proved by the inoculation of the virus from the animal to man : after the incubation period of 15 days in the places of the inoculation, typical ulcers appeared, swarming with parasites. The leishmaniasis has also been found in *Meriones erythrourus* and *Spermophillopsis leptodactylus*, the typical representatives of the sand desert fauna.

" The authors have come to the conclusion that cutaneous leishmaniasis is a typical zoonotic disease and that rodents should be considered to be the reservoirs of *Leishmania tropica*, spread by Phlebotomus as transmitters.

" The authors consider that the best method for eradicating cutaneous leishmaniasis is poisoning of burrows with chlorpicrine.

" The authors have had one locality put to test, with 70 per cent. of the population infected, but the results could not be recorded in the same season, as the test was started too late."

SMITH (J. Ferguson). **Late Cutaneous Recurrence of South American Leishmaniasis after Treatment with Antimony.**—*Brit. Jl. Dermat. & Syph.* 1942. Aug.–Sept. Vol. 54. Nos. 8–9. pp. 231–234. With 1 fig.

The paper discusses the case of a seaman who developed extensive ulceration on the inner aspect of both legs after an insect bite on the left leg when on board ship in the River Plate off Rosario. It seemed probable that the condition was leishmaniasis, though the most careful search failed to reveal any leishmania. Complete healing, however, followed courses of tartar emetic and neostibosan. Eight years later a small nodule appeared on the outer aspect of the right leg. This increased in size during the next few months and finally ulceration occurred. Again undoubted leishmania were not found and again courses of tartar emetic and neostibosan cured the condition. The case is evidently one of relapse, for the patient had not been abroad in the interval, but whether it was leishmaniasis or not must remain doubtful in view of the complete failure to demonstrate the parasite in material from the lesions. *C. M. Wenyon.*

SIMONETTI (G.). Röntgenterapia della leishmaniosi cutanea. [**X-Ray Treatment of Oriental Sore.**]—*Boll. d. Soc. Italiana di Med. e Igiene Trop.* (Sez. Eritrea.) Asmara. 1942. Vol. 1. No. 2. pp. 25–26. English summary (3 lines).

A single case successfully treated. *C. W.*

IRIARTE (David R.). Leishmaniosis. [**Leishmaniasis.**]—*Bol. d. Lab. Clin. "Luis Razetti."* 1942. June. Vol. 2. No. 8. pp. 141–145. With 4 figs.

A record of a case in Venezuela. *C. W.*

FEVERS OF THE TYPHUS GROUP AND OTHER FEVERS.

PINKERTON (Henry). **The Pathogenic Rickettsiae with Particular Reference to their Nature, Biologic Properties, and Classification.**—*Bact. Reviews.* 1942. Mar. Vol. 6. No. 1. pp. 37–78. [133 refs.]

This paper is really a valuable monograph dealing with certain aspects of the bacteriology of the pathogenic Rickettsiae. It includes a list of 133 references to the literature, but this hardly does justice to the French workers on the subject. Apart from the great value of the systematic review that is given of the work of other observers the article is of special interest because of the opinions expressed by the author on certain controversial matters.

The Rickettsia of murine, flea-borne, typhus is regarded as a variety of *Rickettsia prowazeki* and is called *R. prowazeki* (var. *mooseri*). From the practical point of view its most important distinguishing feature is that it grows much more luxuriantly in experimental animals and in media containing living cells, and so lends itself more readily to the preparation of vaccines than *R. prowazeki* of the classical type. Both varieties of *R. prowazeki* retain their special features in a constant manner, "nobody has succeeded in changing one variety

into the other, even after years of passage in different species of animals." Human typhus Rickettsiae when passaged through rats and then back to guineapigs do produce a severe scrotal reaction, but in subsequent transfers this reaction reverts to the mild and inconspicuous type. Some workers believe, "without anything like conclusive proof," that severe epidemic infection with *R. prowazeki* var. *prowazeki* can, in certain conditions, evolve from a single case of infection with *murine* Rickettsiae acquired from a rat by the bite of a rat flea. On the other hand there is reason to believe that important epidemics may start directly from persons living in places where human typhus of murine origin is endemic, without the necessity of transformation of one variety into the other.

The virus of tick-borne fevers resembling typhus is regarded as belonging to a separate genus and so should be called *Dermacentroxenus rickettsi* (Wolbach 1919). It causes a number of essentially similar diseases, often showing minor clinical variation in many parts of the world. Its most striking feature is its preference for the cell nuclei, which are sometimes distended with organisms, but there are also certain morphological differences from *R. prowazeki*. The essential lesion caused by the organism is the same as that caused by *R. prowazeki*, *viz.*, a specific endangitis. Focal brain lesions were believed to be peculiar to typhus, but they are also caused in guineapigs infected with *D. rickettsi* if the animals survive long enough to allow of their development. Great differences occur in the virulence for guineapigs, some strains cause practically 100 per cent. mortality, others are never fatal. The exact relationship between the strains causing Rocky Mountain spotted fever, boutonneuse fever and tick-bite fever is not entirely clear. R. R. PARKER in a personal communication to the author reported that although guineapigs recovered from Rocky Mountain fever were solidly immune to boutonneuse fever and *vice versa*, yet a vaccine which protects the animals against Rocky Mountain fever is completely ineffective against boutonneuse fever, so that the virus of the latter disease can be regarded as a somewhat modified strain for which the name *D. rickettsi* (var. *conori*) is suitable. The author is not convinced that the virus of tick-bite fever is different from that of boutonneuse fever [an opinion in accord with that of ALEXANDER, MASON and NEITZ, see this *Bulletin*, 1941, Vol. 38, p. 203]. For the tick-borne infections a special agglutination test, in which Rickettsiae are used, has advantages over the Weil-Felix reaction; it is more reliable and gives a presumptive diagnosis earlier in the course of the disease.

The author, with HOFGAARDEN, has found that sulphathiazole, neoprontosil, sulphapyridine, fouadin and atebrin are useless in the treatment of guineapigs infected with the typhus virus; these results are stated to be similar in all instances to those obtained by TOPPING, but "with even greater emphasis on the detrimental effects." The Rickettsia of tsutsugamushi is briefly discussed; apart from the low degree of susceptibility of experimental animals, it seems to be of the same general type as those of typhus and spotted fever.

Rickettsia wolhynica is said to be the probable cause of trench fever but the evidence of its aetiological relationship to the disease is regarded as incomplete.

[It will be a pity if bacteriologists should feel compelled to insist that the virus of the tick-borne typhus-like fevers belongs to a separate genus, especially as these fevers are so closely related in their clinical

and pathological aspects to typhus and the other fevers which are commonly regarded as belonging to the typhus group. The reviewer does not pretend to have given an adequate account of this very interesting paper, which itself is a highly condensed abstract of a large number of important contributions to the literature of the subject.]

John W. D. Megaw.

MEGAW (J. W. D.). **Louse-borne Typhus Fever.**—*Brit. Med. Jl.* 1942. Oct. 3 & 10. pp. 401–403 ; 433–435. With 1 chart.

In this account of what probably is, and certainly may become, one of the most devastating diseases of the war, especially in Eastern Europe and North Africa, the reader will find a concise and well-informed description. All aspects of the disease are dealt with, but the author has laid special stress upon the clinical features and the methods of diagnosis. He has brought together much recent information on prevention, including the methods of immunization, and treatment. In conclusion he gives an account of the other fevers of the typhus group [perhaps Q fever of Australia and Montana, a Rickettsial disease transmitted by ticks, should now be included with Rocky Mountain fever and other allied diseases, as a member of this group.]

The paper cannot further be abstracted, but should be read with attention by all who may come into contact with the disease. *C. W.*

ZIMMERMANN (E.). Zur Epidemiologie des Fleckfiebers im Generalgouvernement. [**The Epidemiology of Typhus Fever in German-Occupied Poland.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1942. Mar. 16. Vol. 123. No. 5. pp. 552–557.

In Poland the disease is now assuming the form of a war epidemic, though on a smaller scale than was generally expected.

In 1919, 44,000 cases were reported in Poland, the number fell steadily to 320 in 1930 and since that year the cases have fluctuated between 420 and 1,000 till 1938. No figures are available for 1939. In 1940, 7,900 cases were reported, but there must also have been many mild attacks which were not included in the figures.

The author states that 67,893 persons were inoculated with Weigl's vaccine between 1930 and 1938.

About 70 to 80 per cent. of the cases in 1940 were in Jews [this is not surprising in view of the conditions to which they were subjected]. The case mortality rate was only 5·6, it ranged from *nil* in persons under 16 years of age to more than 30 per cent. in persons over 35 : it was as high in Jews as in the rest of the community.

More than half of the persons attacked were young ; the incidence was highest in the 16 to 20 age group, in which nearly a quarter of all the cases occurred.

In the early winter of 1939–40 there were only a few sporadic cases, but after the new year cases began to appear in a number of widely separated towns between which there was little chance of communication. It is suggested that the most likely reservoir of infection was in clothing infected by dried louse faeces in which the virus can survive for months. The disease soon began to spread rapidly in the large towns ; infection was probably conveyed by beggars and tramps, chiefly Jews who were hounded from place to place. The worst outbreaks were in places where the Jews were herded together, sometimes with only three to four square metres of floor space for each person. In April and May the incidence became less in the towns, but the disease

spread among the peasantry in isolated houses and small centres of population. In the second half of June the epidemic suddenly subsided in the usual way. During the summer months there were only a few isolated cases, but in November the cold-season rise made its appearance. *John W. D. Megaw.*

LÖFFLER (W.) & MOOSER (H.). Zum Uebertragungsmodus des Fleckfiebers. Beobachtungen anlässlich einer Laboratoriums-Gruppeninfektion. [**The Modes of Transmission of the Typhus Fevers.**]—*Schweiz. Med. Woch.* 1942. July 11. Vol. 72. No. 28. pp. 755–761. With 6 figs. [33 refs.)

This important paper consists of two parts: the first contains a valuable and fully documented account of the evidence which bears on the modes of transmission of louse-borne and flea-borne typhus fever. This in itself is a condensed summary to which justice cannot be done in an abstract but it will be found very useful by all workers on the typhus fevers. Among the many matters dealt with special mention is made of the work of ARKWRIGHT and BACOT, who showed that the salivary glands of lice contain no Rickettsiae, so that these insects can hardly transmit the virus directly by the mere act of biting. The possible modes of transmission of typhus virus in natural conditions are: (1) The Rickettsiae contained in the faeces and crushed bodies of lice may enter through scratches of the skin; (2) the Rickettsiae may be introduced by the biting apparatus which has been soiled with infected faeces of the lice; (3) Rickettsiae contained in the faeces of lice may be introduced into the conjunctiva by fingers which have been soiled through crushing the insects; and (4) dust particles resulting from the drying of the faeces of infected lice may be inhaled.

Mooser and his colleagues have shown that lice cannot become infected by biting persons who have "inapparent" attacks, so that infection cannot be carried over from one outbreak to another by these inapparent cases. BLANC believes that infected louse faeces constitute the reservoir of infection in inter-epidemic periods. It must be assumed that clothing discarded in the summer can harbour the virus in the dried faeces of the lice; that the faeces remain virulent and can afterwards infect susceptible persons through the respiratory tract: louse transmission would then begin again. Another possibility is that murine Rickettsiae, harboured by rats and transmitted from them to human beings by rat fleas, may then be transmissible by human lice, and so give rise to epidemic typhus fever. Human fleas are also regarded as possible reservoirs of the virus of human typhus.

The mode of infection in laboratory workers who have been handling the Rickettsiae of murine and classical typhus is not altogether clear. Lice must be responsible in the cases in which they alone are being used in the preparation of vaccines, but cases also occur in laboratories in which lice are not used, but only experimental animals. NICOLLE believed that fleas on these animals were responsible, whereas Mooser held that Rickettsiae from the infected animals entered the body through the skin. More recently special attention has been paid to the possibility of infection through the conjunctiva and nasal passages; infinitesimal quantities of louse faeces can convey the infecting dose, as is shown by SPARROW's finding that the intestine of an infected louse may contain up to 1,000 million infecting doses for the rat. CIUCA has reported a case of laboratory infection with classical typhus in the

absence of lice ; in this case mice were being inoculated by the intra-nasal route. These observations support MURCHISON'S view that typhus was highly contagious.

Most epidemiologists maintain that head lice play no part in the transmission of infection ; they are certainly wrong, because one of the present authors has repeatedly found infected head lice on patients. The faeces of these insects must be highly infectious, so that when the louse-infested " mane " of a convalescent is shaken there are great opportunities for the scattering of infected dust.

In the second part of the paper details are given of six cases of laboratory infection caused by a Mexican murine strain of virus which had been isolated from a patient more than five years previously. The strain had been maintained in guineapigs and had fully maintained its original characteristics. A laboratory attendant had a severe attack of typical typhus fever shortly after the commencement of work on this strain, in the course of which rats and mice were inoculated by the nasal route with emulsions of pneumonic lungs. Shortly afterwards three workers who had carried out similar nasal inoculations on 60 mice within half an hour were also attacked within a few days in spite of having worn rubber gloves and blouses as well as gas masks during the operation ; though immediately afterwards they had discarded the masks and remained in the same room. Two female laboratory assistants were also attacked, though one of them had taken no part in the experimental work and had only come into the room for a few moments shortly after the inoculations had been performed ; the other was engaged in feeding the inoculated mice, and had on one occasion been in the same room soon after the end of the operation.

The former of these two female patients could not possibly have been infected in any other way than by the inhalation of infected particles sprayed into the air during the explosive expiratory efforts of the mice, and the other persons were probably infected in the same way. Inhalation infection can happen all the more readily because the epithelial cells of the respiratory tract are known to be specially suitable for the development of the Rickettsiae. A conspicuous feature of the onset of all the attacks was an influenza-like catarrh of the lower air passages ; this suggests a local reaction at the site of entry of the virus. There is no question of the spread of infection from one person to another by droplet infection ; the air passages lend themselves to the entry of the Rickettsiae but not to their discharge from an infected person.

One of the patients had been given two doses of vaccine made from the strain that caused her attack ; the first dose was given 10 days and the second two days before the onset. The attack was exceptionally mild and lasted only eight days. Reference is made to a seventh case, not included in the series ; the patient had suffered from typhus fever 14 years previously, and his only symptoms were slight fever, headache and lassitude lasting three days.

In all laboratories in which work is done with typhus Rickettsiae the workers are very liable to be attacked, usually to the extent of 100 per cent. of the personnel in spite of previous inoculation, so that the vaccine cannot completely protect against the intense infection by the respiratory route that occurs in these cases, though it greatly reduces the severity of the attacks. A definite recommendation is made that persons engaged in disinfestation work should be protected not only by inoculation and by wearing louse-proof clothing, but

also by gas masks. The clinical features of the six cases are given in detail: all the patients, independently, thought at first that they had influenza, and apart from the rash the symptoms were such as might occur in any severe febrile infection. The severity ranged from that of a severe attack of typhoid fever to an "inapparent" attack. The Weil-Felix reaction was positive in titres ranging from 1-100 (in the inoculated patient) to 1–10,000. In three cases the temperature fell temporarily almost or quite to normal soon after the onset, thus showing Nicolle's "crochet." A remittent type of temperature predominated in most of the cases and the fall was by gradual lysis in five. There was a general tendency to leucopenia; leucocytosis occurred in two cases; in one due to pneumonia, in the other to cystitis and phlebitis. *John W. D. Megaw.*

DONALD (C.) & BARKER (P. B.). **Louse-borne Typhus Fever.**—*Brit. Med. Jl.* 1942. Sept. 19. pp. 333–335.

This is an account of an outbreak of typhus which occurred in a prison camp, somewhere in Germany. There were 21 cases, of which three were fatal. The nationality of the patients is not stated; 16 of them were employed in handling clothing at a camp disinfector.

The onset in one case was like that of appendicitis and a laparotomy was performed. In five mild cases no rash was seen; in four cases the rash extended to the face. The palms and soles appear to have been affected in all the cases in which the rash was visible. The fever lasted 17 days on the average, it tended to terminate by lysis lasting three or four days. After the fall of the temperature the patients were very emotional, and continued to have bouts of delirium and transient delusions. There was marked dyspnoea, with stertorous breathing and working of the alae nasi, in all the patients. Cheyne-Stokes breathing was seen for a short time before the end of the fever. The blood pressure was normal except in one patient who had hypertension during early convalescence, with a systolic reading of 180 to 190; this persisted for six months and then disappeared. Several patients had diplopia. In a number of cases the symptoms suggested epidemic encephalitis, and in one of the fatal cases the post-mortem findings were of this type. There was initial polycythaemia, followed by anaemia, the haemoglobin and red blood corpuscles being reduced by 20 to 30 per cent. after the appearance of the petechial rash. In one fatal case the leucocyte count on the fifth day was 4,400; in another on the seventh day it was 6,400.

The Weil-Felix reaction was positive in all the cases tested after the seventh day and negative in all those tested before the fifth day.

Sulphonamides, antipyretics, and hexamine were tried, but all were useless. Fluids with glucose were given freely by the mouth and, when necessary, also by the rectum or intravenously; up to five or six litres were given daily. Luminal and omnopon-scopolamine controlled acute delirium and insomnia. Lumbar puncture relieved severe cerebral irritation. Tepid sponging was useful. *John W. D. Megaw.*

DENNIG [**Differential Diagnosis of Typhus.**]—*Ztschr. f. arzt. Forsch.* 1942. No. 9. Translation of abstract in *Ars. Medici.* 1942. Vol. 32. No. 7. p. 340.

At the peak of infection diagnosis can at once be clinched from the flushed face with conjunctivitis, numbness, high fever, and the spots.

Great care must be taken in looking for spots, which appear on the 3rd–6th day and last for about 10 days, as they may be only few in number and may not appear on the face. The Weil-Felix reaction usually becomes positive on the 5th day and increases thereafter ; but 20 per cent. of the cases do not agglutinate till the 15th–20th day and even indeed not at all. A titre of 1 : 100 is very significant. The existence of pneumonia is shown by the infiltration, blood-stained sputum, rigors, which are seldom seen in uncomplicated typhus, and leucocytosis, whereas in typhus there is a leucopenia of about 6,000 [*sic*], in typhoid the rise of the fever is slower, the patient indeed being uncertain when the disease started, while in typhus the day and hour can be given accurately. The enlarged spleen is harder, the bradycardia and leucopenia (1,500–3,000) more pronounced. The rash starts to appear from the 7th day and for a week or two new outbreaks occur and after 2–5 days disappear. The spots mostly appear on the trunk, not more than 5–10 in number. In typhus they are raised, larger and more numerous and occur on the extremities, including even the hands, where they are never seen in typhoid. They do not disappear on pressure since they are haemorrhagic. If there are only even a few eosinophils in the blood this is strong evidence against typhoid. Numbness and unrest at night are much more intense in typhus. The Widal agglutination is practically valueless in those who have been vaccinated. The same applies to paratyphoid, which, however, has seldom so severe a course that it can be confused with typhus. Epidemic meningitis begins suddenly with rigors, neck rigidity, Kernig's sign, and hypersensitivity. The C.S.F. is cloudy, while it is clear in typhus, and the cells are greatly increased (1,000 per cubic millimetre) while in typhus they are normal or at most 200 per cubic millimetre. At the start typhus can resemble angina, yet the throat symptoms are slight and the fever persistent. In influenza the fever falls by lysis in a few days, although of course it often rises again ; tracheitis, bronchitis, cold in the head are prominent, but there is no numbness. In bronchopneumonia it is often necessary to clinch the diagnosis by the Weil-Felix reaction. Measles attacks the face. Inexplicably high fever in wounded and frostbitten patients must also indicate the possibility of typhus.

Bury (K. J.). Zur Fleckfiebertherapie mit Sulfonamiden. [**The Treatment of Typhus Fever by Sulphonamides.**]—*Klin. Woch.* 1942. Aug. 8. Vol. 21. No. 32. pp. 709–710. [14 refs.]

During the preceding eighteen months 254 cases of louse-borne typhus were admitted to the State Hospital of Sosnowitz [in S.W. Poland]. Of these, 51 were treated with various sulphonamides, including sulphapyridine (" Dagenan " of French or Polish origin), prontosil, sulphathiazole, albucid and an experimental preparation " Be 1034 " (an azo-sulphonamide compound made by Bayer). The last-named drug seemed to have a definite action in reducing the severity, though not the duration, of the attacks ; the others had no significant action, in fact the treated patients had a greater tendency than the controls to suffer from extremely low blood pressures. Secondary infections were less frequent and less severe in the treated cases so that the sulphonamides are recommended when these complications arise.

No details are given of the number of persons treated with each of the sulphonamides but care was taken to ensure that the patients in each group should be comparable in age, state of nutrition and severity of disease.

The drugs were given in full doses in courses not exceeding six days. Rectal administration was sometimes employed and albucid was given intravenously in some of the cases.

A summary is given of previous work dealing with trials of the sulphonamides in Rickettsial infections. Reference is made to the successful use of sulphapyridine by MAGERL in trench fever [but as already pointed out Magerl's cases were probably not of trench fever. See this *Bulletin*, 1942, Vol. 39, p. 154]. Animal experiments have yielded conflicting results; TOPPING found that prontosil and sulphapyridine had a harmful effect on guineapigs inoculated with *Rickettsia prowazeki* and *R. rickettsii*, whereas WOHLRAB found that mice infected with *R. prowazeki* suffered less severely when treated with sulphanilamide, disulphanilamide and a preparation with the formula 4′-sulphonamide-2, 4-diaminoazobenzol-6-carbonic acid.

John W. D. Megaw.

STURM (A.). Neue Wege in der symptomatischen Fleckfiebertherapie. [**New Methods of Symptomatic Treatment of Typhus Fever.**]—*Muench. Med. Woch.* 1942. Aug. 21. Vol. 89. No. 34. pp. 733–735. With 1 fig.

A purely symptomatic treatment was adopted in 17 cases of typhus fever in soldiers aged from 20 to 44 years. Two of the patients died on the 10th and 15th days respectively; the author rightly apologizes for stating that the case-mortality rate was 11·76 per cent. The average duration of the fever in the survivors was about 16 days. The temperature curves are shown; these differ in no way from types often seen in groups of untreated cases so that it is not easy to accept the claim of the author that striking benefit resulted from the treatment. In the circumstances a detailed account of the elaborate system that was adopted need not be given.

To every patient the following drugs were given daily, "A.T.10," "T.C.6," "digipurat," "veritol," "cebion forte" and "betaxin": in cases with low blood pressure "cardiazol" "coramin" and "cortiron" were also given.

John W. D. Megaw.

WOHLRAB (R.). Flecktyphusbekämpfung im Generalgouvernement. [**Typhus Control.**]—*Muench. Med. Woch.* 1942. May 29. Vol. 89. No. 22. pp. 483–488.

GOLD (Herman) & FITZPATRICK (Florence). **Typhus Fever in a Previously Vaccinated Laboratory Worker.**—*Jl. Amer. Med. Assoc.* 1942. Aug. 22. Vol. 119. No. 17. pp. 1415–1416. With 1 chart.

This is yet another report of a mild attack of typhus fever in a vaccinated laboratory worker. The patient had been engaged in preparing vaccine from the yolk sacs of chick embryos inoculated with the Breinl strain of *Rickettsia prowazeki*. Rubber gloves, goggles, a face mask and sterile gown were worn and precautions were taken to prevent the escape of infected spray from the machine used in grinding

the yolk sacs; yet the infection was apparently contracted through the respiratory tract [presumably by particles of spray which escaped into the air after the grinding machine had been uncovered].

The attack was mild, the fever was deeply remittent and lasted about nine days. The temperature rose above 101°F. on four days. Virus was isolated from blood taken on the fifth day of the illness, but only one of five guineapigs inoculated on the fifth and sixth days reacted. The patient had received 4 cc. of Cox's vaccine in four doses, the first of which was given three months and the last seven days before the onset of the fever. The agglutination and complement fixation responses at various stages are shown in an abstracted form in the table:—

	Agglutination tests		Complement fixation titre
	Proteus OX19	Rickettsiae of European typhus	
Before vaccination ...	+ $\frac{1}{80}$, ± $\frac{1}{160}$	− $\frac{1}{20}$	0
10 days after 3rd dose of vaccine	+ $\frac{1}{80}$, ± $\frac{1}{160}$	+ $\frac{1}{20}$, ± $\frac{1}{40}$	0
5th day of fever ...	+ $\frac{1}{160}$	+ $\frac{1}{80}$	$\frac{1}{64}$
13th day	+ $\frac{1}{640}$, ± $\frac{1}{1280}$	+ $\frac{1}{160}$, ± $\frac{1}{320}$	$\frac{1}{1024}$
54th day	++ $\frac{1}{160}$, ± $\frac{1}{320}$	+ $\frac{1}{160}$	$\frac{1}{512}$

It will be seen that the immunological response to inoculation was poor. Another technician who had been vaccinated in the same way and had been exposed to the same risk of infection was not attacked; in that case the response to vaccination was good; the Rickettsial agglutination titre was positive 1–80 ten days after the third dose.

Another case of laboratory infection is reported in an addendum to the note. A suspension of European Rickettsiae was accidentally splashed over the face and right eye; four days later an attack of fever followed and lasted four days. Virus could not be isolated from the blood collected on the first and second days but the agglutination titre to *Proteus OX19* and also to *R. prowazeki* was 1–1,280 on the 8th day. This patient had also been vaccinated with an egg-yolk vaccine of which 4½ cc. in all were given in five doses: the last dose was injected three months before the onset. The vaccine had caused no change in the Weil-Felix titre but the Rickettsial agglutination titre had risen from nil to positive 1–80 and the complement fixation titre from nil to 1–80 five weeks after the last dose.

The authors point out that if protective vaccination is adopted on a large scale in troops it will be necessary to keep a strict lookout for modified cases which may be indistinguishable, in their clinical features, from fevers like influenza. In such cases the Rickettsia may be present in the blood in infective form, as is shown by its recovery in one of the reported modified attacks. *John W. D. Megaw.*

COMBIESCU (D.), ZOTTA (G.), MANCIULESCU (E.), POP (A.) & TASCAU (J.). Die Schutzimpfung des Meerschweinchens gegen den klassischen Flecktyphus mit Hilfe formolgetöteter Rickettsien aus Mäuse- und Hundelunge. [**The Protective Inoculation of Guinea-pigs against Classical Typhus by Formol-killed Rickettsiae from the Lungs of Mice and Dogs.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1942. Mar. 16. Vol. 123. No. 5. pp. 612–626. With 12 figs. [20 refs.]

Rickettsia prowazeki has been cultivated in the lungs of young dogs inoculated by the respiratory route and kept at a temperature of 0°C. The yield of Rickettsiae from a given weight of lung was about half that obtained from the same weight of mouse lung, but the total weight of the dog lung was 200 to 300 times greater than that of the mouse lung.

The strain of virus used came originally from Bessarabia, and had been passed through guineapigs. The blood and brain suspensions of infected guineapigs when inoculated intranasally into mice failed to cause Rickettsial pneumonia, so that to begin with it was necessary to inoculate mice with suspensions of infected lice which had been inoculated by Weigl's method. Thereafter suspensions of the lungs of the infected mice were used and death followed regularly within 72 hours, with massive hepatization. Smears of the lungs were very rich in Rickettsiae; secondary and mixed infections were rather few, but in some cases a pseudo-diphtheria bacillus was found in the smears. The authors had often found similar secondary infections in yolk-sac cultures.

As the small size of the mouse lung was a serious drawback to the large-scale production of vaccine, larger animals were tried and *Citellus citellus* as well as young dogs were found suitable. In the experiments now described young dogs (four weeks old) were used; each was given an intratracheal inoculation with a suspension made from the lungs of two mice which had been inoculated in a similar way about three days previously. The dogs were kept at a temperature of 0°C. and death resulted in less than 72 hours in three of the four animals. Suspensions made from mouse lungs and dog lungs were killed with formaldehyde and injected into guineapigs. Both kinds of vaccine provoked a moderate but variable degree of immunity. Better results were obtained when the total quantity of vaccine was given in three divided doses at five-day intervals than when it was given in one or two doses.

Details are given of the method of preparing and testing the vaccine:—The lung is ground with sand and suspended in a mixture of ascitic fluid and normal saline (1 to 5) buffered to *p*H 7·4. To this formalin is added to a proportion of 0·2 per cent. The suspension is centrifuged for five minutes at 1,000 revolutions, the supernatant fluid is then centrifuged for 45 minutes at 5,000 revolutions, and the grey sediment is suspended in buffered saline of *p*H 7·4 to which formalin is added to a strength of 0·2 per cent.

The average mouse lung of 0·3 gm. gives 10 cc. of vaccine, which serves to immunize four persons.

The temperature charts of all the guineapigs used in the tests are given; from these workers can form their own opinions about the efficacy of the vaccines. The results obtained from mouse-lung vaccines seem to have been better than those from dog-lung vaccines.

John W. D. Megaw.

GIROUD (Paul) & PANTHIER (René). Comportement du cobaye à l'inoculation de doses massives de rickettsies du typhus historique issues de poumon de souris ou de lapin. [**The Reponse of the Guineapig to Inoculation with Massive Doses of the Rickettsia of Historic Typhus Obtained from the Lung of the Mouse or Rabbit.**]—*Ann. Inst. Pasteur.* 1942. Jan. Vol. 68. No. 1 pp. 95–98.

The usual response of the guineapig to historic typhus is well known to be a rise of temperature for 8 to 10 days after an incubation period of 7 to 10 days. Bacilliform Rickettsiae are rarely found in smears of the organs. The authors have already shown that by keeping the infected organs of the guineapigs (to be used for infecting others) at —25°C. and by lowering the resistance of the inoculated animals by daily injections of bacterial toxins (such as anti-typhoid vaccine) a severe disease is caused with subnormal temperature and abundant multiplication of Rickettsiae in the exudates. The virus contained in these exudates becomes adapted to the production of pulmonary lesions in mice after two or three lung passages. When rabbits have their resistance lowered in a similar manner they respond to intratracheal injection of mouse-lung virus by a severe pulmonary reaction. After two or three lung passages in the rabbit, smears made from the consolidated lungs of the animals contain almost as many Rickettsiae as mouse-lung smears. Guineapigs inoculated with rich rabbit-lung suspensions by the intraperitoneal route respond by a severe illness; usually the incubation period is only 24 hours and the temperature remains above 40° or 41°C. for seven or eight days. Usually also there is an orchitic reaction on the fourth or fifth day. After this first period of illness the symptoms disappear for two or three days, and again there is a short rise of temperature. For several days there is a peritoneal reaction; this is shown by the refusal of the testicles to descend when an attempt is made to press them down into the sac. This sign may entirely replace the scrotal enlargement. The virus when repeatedly passed through guineapigs by the peritoneal route returns to its former low level of virulence for the animals, and so it retains its original properties in spite of having become adapted to mouse-lung transmission. *John W. D. Megaw.*

GIROUD (Paul) & PANTHIER (René). Adaptation au poumon de lapin des rickettsies du typhus historique. [**Adaptation of the Rickettsia of Historic Typhus to the Lung of the Rabbit.**]—*Ann. Inst. Pasteur.* 1942. July–Aug. Vol. 68. No. 7–8. pp. 381–390. With 1 fig.

This paper describes a further development of the work of DURAND and GIROUD in which they produced a vaccine against historic typhus by the intratracheal inoculation of rabbits with suspensions of lungs of mice infected by the nasal route with *Rickettsia prowazeki.* [See this *Bulletin*, 1941, Vol. 38, p. 686.] Large quantities of vaccine could be produced in this way, but the method was inconvenient because of the need for maintaining a mouse-lung strain of the virus for the purpose of ensuring a supply of suspension rich enough in Rickettsiae to cause effective inoculation of the rabbits. This difficulty has now been overcome by lowering the resistance of the inoculated rabbits, which are partly shaved, kept in a cold environment and injected intraperitoneally, at intervals, with suspensions of bacteria killed by heat. No fixed rules can be laid down for these injections, the size and frequency

of the doses depend on the reactions caused in each animal, the temperature curve, loss of weight, and general condition must be taken into account. Animals killed from three to five days after inoculation have lungs rich in Rickettsiae and weighing from 30 to 50 grammes. Bacterial contaminations are exceptional, and each rabbit yields at least a litre of potent vaccine. The intratracheal inoculation of rabbit-lung suspensions into other rabbits gives rise to pulmonary lesions which are as severe as those caused by mouse-lung suspensions. When inoculated by the intraperitoneal route these suspensions also cause a severe illness with orchitic reaction in guineapigs. Applied to the scarified skin of a guineapig they cause a reaction very similar to the normal response of the animal to intraperitoneal inoculation with the ordinary type of historic virus.

The immunizing power of the vaccines made from rabbit lungs was put to a severe test: guineapigs which had received three doses of the formol-killed vaccine were found to be as well protected as animals which had recovered from a severe attack caused by intraperitoneal inoculation of large doses of living virus. *John W. D. Megaw.*

GIROUD (Paul). Pouvoir antigénique comparé des substances extraites du poumon de lapin infecté de typhus historique et des rickettsies isolées. [**Antigenic Power of Substances Extracted from the Lungs of Rabbits Infected with Epidemic Typhus Compared with that of the Isolated Rickettsiae.**]—*C. R. Soc. Biol.* 1942. Apr. Vol. 136. No. 7–8. pp. 342–343.

The lungs were preserved at −25°C. and subsequently triturated with formol saline (0·2 per cent.). The supernatant fluid after centrifugation, which appears to contain soluble substances set free on the lysis of the Rickettsiae, was used and its antigenic power estimated, in comparison with that of (1) the same extract with the addition of Rickettsiae, (2) Rickettsiae alone, and (3) the extract heated to various temperatures. Animals were inoculated with these substances, their sera were subsequently mixed with Rickettsiae and injected intracutaneously into normal animals and the reactions noted [positive if the serum does not contain protective substances, see this *Bulletin*, 1938, Vol. 35, p. 790].

The extract has good antigenic powers, perhaps better than those of isolated Rickettsiae, but not so good as those of extract *plus* Rickettsiae. *C. W.*

HAYES (Justin E.) & GILL (Charles E.). **Typhus Fever in Massachusetts. Report of a Case Contracted in an Out-of-State Endemic Area.**—*New England Jl. of Med.* 1942. June 4. Vol. 226. No. 23. pp. 916–917.

CARRETERO (Alfonso Vargas). Tifus exantematico murino en Valparaiso. [**Murine Typhus in Valparaiso.**]—*Med. Moderna.* Valparaiso. 1942. Jan. Vol. 15. No. 6. pp. 269–286. With 1 folding plan.

During the first seven months of 1941 fifteen cases of a typhus-like fever were treated in the German Hospital, Valparaiso. This was a relatively large number considering that only 55 cases were reported during the same period in the whole of Valparaiso and Vina del Mar.

The economic condition of 11 of the patients was exceptionally good, it was good in the other four. Louse infestation and contact with louse-infested or infected persons were excluded in all the cases. In only one instance did more than one patient come from the same house; in this case two patients were attacked almost at the same time so that there was no question of transmission of infection from one to the other. The seasonal incidence was quite different from that of louse-borne typhus in Valparaiso. The patients came from widely separated localities situated in commercial or industrial areas in which the rat-infestation rate was high, and ten of the patients were known to have been exposed to exceptional risk of being bitten by rat fleas. Rats caught in a market in Valparaiso in July and August 1941 were found to harbour Rickettsiae.

The clinical features of the disease resembled those of mild typhus fever; there were no deaths. The Weil-Felix reaction was positive in 13 cases in titres of 1–100 to 1–6,400, it was negative in one patient who was tested only on the 7th day, and the titre was only 1–50 in another tested only on the same day of the illness. No animal inoculations were carried out but the clinical and epidemiological features pointed strongly to a flea-borne infection.

John W. D. Megaw.

Barlovatz (A.) & Joukovsky (Th.). Quinze cas de fièvre pseudo-boutonneuse observés au Congo belge. [**Fifteen Cases of Pseudo-Boutonneuse Fever seen in the Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. June 30. Vol. 20. No. 2. pp. 157–171. With 1 chart.

Early in the course of this article the authors express a desire to "avoid the addition of a new barbarous name to a list that is already too long" but they have used three new and distinct names for the disease; these are "erratic fever," "pseudo-boutonneuse fever" and "boutonneuse-tick-bite fever."

The disease differs in its epidemiology from both boutonneuse and tick-bite fever in the complete absence of contact on the part of the patients with dogs or tick-infested cattle. Ticks are said to be rare in the forests of the district. Ten of the 15 patients had a local sore; this was on the scrotum in nine cases and on the thigh in one. The situation of this "inoculation sore" pointed to a tick or mite as the vector, yet none of the patients recalled a bite by an "insect." All the patients were seen in Maxiema, a hot and damp forest region in the Belgian Congo; they came from two places 120 kilometres apart with a total European population of 300. Twelve of the patients were Europeans and eight of these had not been in the forest for several weeks before the onset; none of them kept dogs, pigs or cattle. The cases were strictly sporadic, no person-to-person infection occurred and the seasonal distribution was impartial over the whole period of 18 months.

The fever curve had a step-like rise, an irregular deeply remittent course and an average duration of 11 days; the extremes being 8 to 13 days. The local sore was accompanied by lymphadenitis with associated single or multiple buboes which sometimes preceded and sometimes followed the onset of the fever. There was generalized adenitis in all the cases. The attacks were mild; no patient was dangerously ill at any time. The rash was maculo-papular; it always appeared on the fourth day, extended over the trunk and limbs,

and usually reached the face. In one of the indigenous patients no rash could be detected. The palms and soles are not mentioned as having been involved except that in one severe case the palms but not the soles were involved. No cases were seen in the local indigenous population; it was presumed that they had become immunized by previous attacks.

The Weil-Felix test was made in six cases; in four it was negative throughout the illness and convalescence. In one patient it was negative in tests made up to the 20th day but on the 27th day the titre to *Proteus OX19* was 1–100 and to *Pr. OX2*, 1–200; in another patient there was a positive reaction to *Pr. OX2*, 1–200, two days after the end of the fever. The reaction to *Pr. OXK* was negative throughout in all the cases.

Clinically the disease closely resembles the typhus of Kenya, the pseudo-typhus of BRUMPT, and boutonneuse fever. Three guineapigs and one monkey were inoculated intraperitoneally with 5 cc. each of blood from febrile patients, but no reactions followed. In this respect the disease resembled boutonneuse fever.

[The authors do not express any opinion about the vector: the clinical and serological features point to a mild tick-borne typhus but the epidemiological conditions do not support this view. The Weil-Felix responses are strongly opposed to a mite-borne or flea-borne infection.] *John W. D. Megaw.*

SYLLA (Adolf). Ueber die Wolhynische Krankheit. [**Wolhynian Disease (Trench Fever).**]—*Med. Klin.* 1942. July 31. Vol. 38. No. 31. pp. 726–729. With 3 charts.

The author prefers the name "Wolhynian disease" to "Wolhynian fever" because many of his cases did not run a febrile course. He regards the transmission of the infection by lice as firmly established, but has not the same degree of certainty about the causal organism. Mixed infection may play an important part and spirochaetes deserve consideration: in fact he prefers to regard the condition as a group of diseases rather than as one.

Although he has seen about 200 cases of typical Wolhynian fever in one sector of the front during the present epidemic he states that cases of the disease as described in the last war were really exceptional. [He appears to be referring to the relapsing type with five-day periodicity and perhaps he has not read the British descriptions of the disease.]

Most of the cases were ambulatory and the patients remained on duty: headache, pains in the back of the neck, loins and limbs were universal; usually also there were pains in the bones of the leg, and joint pains were not infrequent. Fever was slight or altogether absent; the whole attack lasted one to seven days.

In the cases admitted to hospital the onset was usually sudden, shivering was exceptional and the temperature seldom exceeded 39°C., in some cases the temperature kept up for three or four days and then fell slowly to normal; in others the fever was fairly high for one day, then fell gradually and was followed by further attacks. Fever with five-day periodicity was exceptional; when it occurred the final spell of fever occasionally lasted five to eight days and ended by crisis. Fever of the undulating type was sometimes seen and often there was low continued fever for a week to a fortnight. Apart from the five-day type there was hardly any characteristic fever curve.

The symptoms, on the whole, resembled those described by writers in the last war, the "shin-bone pains" being prominent features in many cases. The spleen and liver were palpable in about half of the cases and often were tender on pressure. The glands of the neck, axillae and groins were enlarged in five to ten per cent. of the cases; this feature was often accompanied by lymphocytosis, sometimes as high as 60 per cent. Occasionally there was a rash; this was macular, papular or scarlatiniform and was usually fleeting. No change occurred in the blood picture in mild cases; in severe attacks the leucocyte count was raised, the highest count was 12,000.

The total duration of the illness was from one to six weeks. Diagnosis may be quite impossible at first; the onset may closely resemble that of typhus or influenza. Weil-Felix titres of $\pm$1–100 and Widal titres of $+$1–200 were not uncommon. No drug was found to have a curative action; the results from sulphapyridine were not encouraging but neosalvarsan and atebrin were helpful in the early stages.

[No reference is made to the epidemiological conditions connected with the epidemic. The virulence of the infection appears to have been very low; perhaps the shortness of the period of invalidism may have been due to absence of the coddling which some observers think was overdone by us in the last war.

On the other hand it may be that trench fever has not yet got into its stride in the present war; it may again become a serious military problem in louse-infested troops.] *John W. D. Megaw.*

YELLOW FEVER.

HARRIS (W. Victor). **Notes on Culicine Mosquitos in Tanganyika Territory.**—*Bull. Entom. Res.* 1942. Sept. Vol. 33. Pt. 3. pp. 181–193. With 1 fig. [10 refs.]

The author has undertaken work on the Culicines of Tanganyika as a part of the precautions undertaken against the possible spread of yellow fever.

The first part of the paper presents a full list of all the species known to occur in the Territory with localities and brief notes on breeding places. Nearly 80 species of Culicines have been recorded by the author or previous workers. Harris then passes on to a more detailed treatment of the domestic *Aëdes*. He finds that in domestic water containers in Dar-es-Salaam, *Aëdes aegypti* is much the commonest species: several species of *Culex* are also fairly common, but *Aëdes* species other than *aegypti* are rare. In tree-holes in the same town *Aëdes aegypti* predominates, but *Aëdes simpsoni* and *metallicus* are common. A very large number of trap breeding places, short sections of wide bamboo filled with water, were hung up in many townships. In these *Aëdes aegypti* and *simpsoni* breed abundantly.

P. A. Buxton.

VAN DEN BERGHE (Louis). Sur une variation brusque spontanée du tropisme de la "souche française" neurotrope du virus de la fièvre jaune. [**A Sudden Spontaneous Variation in the Tropism of the Neurotropic French Strain of Yellow Fever Virus.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. June 30. Vol. 20. No. 2. pp. 187–202. With 1 plate. [14 refs.]

The description of a sudden variation in the neurotropic French strain of yellow fever virus which at its 322nd passage in mice was inoculated intracerebrally into a baboon (*Papio jubilaeus*) and produced death in seven days, with all the symptoms characteristic of the viscerotropic strain. A rhesus monkey, inoculated subcutaneously with a liver emulsion of this baboon, died on the fifth day with typical symptoms of the visceral strain, and similar results were obtained in a second rhesus subinoculated from the first. Moreover, when the virus from the liver was inoculated intracerebrally into mice the duration of the resulting encephalitis was 6 to 12 days, and only became shorter after successive passages in mice, recalling the behaviour of ordinary viscerotropic strains. On the other hand extracts of the brain of the baboon, and also of the two rhesus monkeys, at the first passage produced death from encephalitis within five days, recalling the behaviour of a typical neurotropic strain.

The sudden dissociation of the neurotropic and viscerotropic properties of the virus in this baboon seems to be of the nature of a chance variation, and, as the author remarks, this might happen in the case of human subjects vaccinated by Laigret's method, which involves the subcutaneous inoculation of neurotropic virus. It is of interest that the baboon is not susceptible to subcutaneous inoculations of the viscerotropic strain.

The case described can only be explained by the co-existence in the virus of particles with different tropisms. The virus is, in fact, pantropic, but after repeated brain passages there is predominance of neurotropic particles. The influence of the tissue environment seems to decide the preponderance of either viscerotropism (liver) or neurotropism (brain). It is, therefore, not a mutation in the strict sense of the word, but a variation depending on external conditions, in this case the tissues of the host. *E. Hindle.*

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. 1942. Sept. 5. Vol. 120. No. 1. pp. 51–53.—**The Outbreak of Jaundice in the Army.** [Summary appears also in *Bulletin of Hygiene.*]

Circular letter No. 95 from the Surgeon General's Office has described the available relevant data on the occurrence of jaundice in the American Army, presumably as the result of the inoculation of yellow fever vaccine. In the *J.A.M.A.* of August 1st, 1942, page 1110, the Secretary of State for War of the U.S.A. was quoted as giving the figure 28,585 cases with 62 deaths from this disease. [The vaccine used is essentially the same as has been made and used for several million inoculations in Brazil, and in England since November 1937, with no resultant cases of jaundice.]

These cases commenced about March 1942, with the peak of the incidence in the week ending June 20th and a progressive decline since then. Like previous occurrences of this condition in England in 1936 and 1937 and Brazil in 1937, the clinical condition closely resembled

so-called "catarrhal jaundice" or infective hepatitis of unknown aetiology. The incubation period of this disease varies between 40 and 120 days, and extends even to six months in a few cases. [By contrast, in ordinary catarrhal jaundice the incubation period is between 20 and 35 days.] Points of interest were that the temperature was usually normal or only slightly elevated; the leucocyte count usually normal with occasional relative monocytosis, and the most striking fact that about 20 per cent. had pains in the joints and urticaria. The liver was enlarged and tender in about a fifth of the patients. Most of the cases were very mild, many being discovered only at special examinations. The case fatality rate of 0·2 per cent. (based on hospital admissions) is considered to be high, as undoubtedly many patients with mild affections never went to hospital. In general, recovery occurred in four to eight weeks. Sufficient evidence has been obtained for the Surgeon General to feel that he can state that recovery is complete in the vast majority of cases, and that permanent liver damage may occur in only a few.

In the fatal cases death usually occurred within two to six weeks after the onset of the disease, indicating that here the destructive process and removal of débris by lysis is rapid. The areas of liver damage appear to be focal, with complete destruction in some, whereas in others only the central parts of the lobules are affected. Fatty changes are rare and repair is usually brought about by multiplication and hypertrophy of remaining liver cells. [The lesion does not appear to be specific, being very similar to that found in fatal cases of infective hepatitis and arsphenamine jaundice.] There is also marked oedema, often accompanied by intense inflammation of the gastro-intestinal tract. The spleen is usually enlarged. Haemorrhages in the serous and mucous membranes are common. It is notable that in patients who have died from accident or disease subsequent to an attack of jaundice little or no evidence of preceding damage has been found.

One of the most interesting features of this disease has been the absence of secondary cases, in spite of the fact that large numbers of post yellow fever vaccination cases have been in the midst of many times their number of non-vaccinated individuals or individuals vaccinated with non-icterogenic lots. [Those who consider that this disease may result from a sensitization with the human serum used in the vaccine consider this an argument in their favour.]

It is quite evident that this outbreak, like the others that have occurred following the use of a similar vaccine, is not a form of infection with yellow fever virus. As a result of these cases the human serum component has been left out of the vaccine, and it is believed that the risk of jaundice has been eliminated. *F. O. MacCallum.*

Fox (John P.), Manso (Caio), Penna (H. A.) & Pará (Madureira). **Observations on the Occurrence of Icterus in Brazil following Vaccination against Yellow Fever.**—*Amer. Jl. Hyg.* 1942. July. Vol. 36. No. 1. pp. 68–116. With 9 figs., 1 map & 2 charts. [44 refs.]

In 1936–37 both Findlay and MacCallum in England and Soper and Smith in Brazil observed jaundice after a considerable interval in individuals who had received yellow fever vaccine. Shortly after this an attenuated strain of yellow fever virus was developed (the 17D strain) which could be used without the accompanying large amounts

of immune serum, chiefly of human origin, previously necessary. [This strain was adopted for use in U.S.A., South America and England and the method of vaccine preparation has been essentially the same in all these countries.] Growth of the virus has been maintained in suspended cell cultures of chick embryo tissue and serum tyrode (1 : 10). The supernatant fluid of these cultures was used to infect developing chick embryos, which after further incubation were removed and suspended as a 10 per cent. suspension in what was considered to be normal human serum. Over a million people had been inoculated with this new vaccine in the various countries without any serious effects, when Fox and his colleagues met the same jaundice in Brazil as referred to above. The first outbreak occurred four to five months after the use of a single batch in May 1939. There were 1,260 cases diagnosed, with one death. In 1940 two other batches were definitely incriminated. A clinically somewhat similar jaundice was present in non-vaccinated persons in many of the areas studied, but the estimated incidence of the spontaneously occurring disease in the unvaccinated was 0·14 per cent. only, a much lower rate than in the vaccinated group. Certain other lots were followed by a small percentage of cases which, however, were two or more times the rate approximated for the non-vaccinated group. There were about 107,000 people inoculated with the incriminated lots, which produced 1,072 diagnosed cases with 24 fatalities.

As in previous occurrences the incubation period was long, being, in the great majority of cases, 12 to 20 weeks. Clinically the cases greatly resembled those of catarrhal jaundice. As before the duration and severity of the disease varied greatly ; some patients failed to develop icterus, but had typical prodromal symptoms with dark urine, others were ill for more than six months, others died. Death most often occurred from 25 to 40 days after the onset of the illness. In approximately 30 per cent. of cases the liver was found to be enlarged in the first two or three weeks of the disease. Palpable enlargement of the spleen was infrequently noted. Of interest is the absence of any mention of the occurrence of urticaria, which was found in a number of the patients in the recent U.S.A. outbreak. A slight leucopenia was found in some cases. A positive correlation existed between the severity of the disease and the apparent impairment of liver function as indicated by the icterus index or bromsulphthalein tests. However, the average levels of the serum bilirubin were low. In the majority of cases clinical recovery was accompanied by a restoration to normal of the previously and often seriously impaired liver function.

Pathological examination of the fatal cases revealed little of significance except for the liver. The size of the liver was usually reduced. Sometimes it had a nutmeg appearance and was usually granular, or even nodular. The microscopic picture varied in the extreme in different parts of the same liver.

The primary change usually was a degeneration of hepatic cord cells which tended to be more pronounced in the central zones. In cells not yet frankly necrotic the cytoplasm showed hydropic swelling, fine droplet fatty change, and at times the accumulation of bile pigment. The nuclear changes consisted of total swelling, nucleolar oedema, marginal condensation of the chromatin and nuclear pyknosis. Inclusion bodies were never found. Some showed biliary hyperplasia with moderate round cell infiltration and marked fibroplasia in the

periportal area. In some areas all the parenchymal cells had undergone necrosis and the cellular débris had been removed with little or no fibrous tissue proliferation.

Like previous workers on this problem the authors, over a period of eight months, have failed to reproduce the disease in monkeys, rabbits, mice, guineapigs or chicks by inoculation of incriminated vaccine or human material.

They made several very interesting observations in the course of following up their cases. One of the most striking was the extreme variation in incidence from 0 to 19 per cent. of cases in large groups, in different areas, inoculated with the same lot of vaccine. They also found that the incidence was very low in children and adolescents in contrast to the spontaneous disease, which mainly affects this group. They feel that some second factor must play a part in producing this divergence of results in different groups. This factor, as previously suggested, might be of infectious nature or a chronic intoxication. The authors also suggest that it might be merely a state of lowered hepatic resistance due to alimentary deficiencies. Pre-existing immunity to the agent in the vaccine seems improbable to the authors in view of the manifestly greater susceptibility of the adult population and failure of urban populations to be more resistant than the rural inhabitants.

Previous investigators have suggested the possibility that the agent producing this jaundice has been present in the so-called normal human serum used in making the vaccine. As in previous investigations none of the donors whose serum was used gave any history of jaundice, and the serum was heated at 56°C. for 30 minutes before use.

Fox and his colleagues have now eliminated human serum from their vaccine. Sufficient embryos are available for them to use merely the supernatant of centrifuged, finely ground, infected embryos as their vaccine, and the same material is used as seed virus for inoculating subsequent embryos. No jaundice has occurred in 164,000 individuals inoculated with vaccine prepared by this method.

[This is surely one of the most intriguing problems of the present day. It is obvious that the condition is not a form of yellow fever, for the jaundice has been produced in individuals who have been shown to be immune at the time of inoculation, and in others when the vaccine injected was found to contain no active yellow fever virus when inoculated into test animals.

The condition has been produced in people living in U.S.A., England, South America and Africa under all sorts of conditions, but the clinical picture is essentially the same. Fox and his group have suggested that chronic intoxication and dietary deficiency may play a part in South America, but this obviously does not apply to the U.S.A. Army in which the recent outbreak has occurred in large groups under uniform conditions, while other members of the same vaccinated group remain well. Most of the available evidence suggests that the human serum is the culprit. If this is so, carriers of the agent must be rare when one considers the amount of serum previously used for this vaccine, in various places, without such an occurrence. It has been considered to be an infectious agent which one hopefully thought would be destroyed by heating at 56°C. for 30 minutes. Perhaps in these two outbreaks more resistant strains have been encountered. Till the condition has actually been reproduced with the same donor's serum separate from the vaccine, this is still theoretical. Of course there does

remain the possibility that it is the result of a homologous serum reaction due to some rare peculiar property of certain human sera. Transmission experiments, as yet unsuccessful, seem to hold the key to the problem.] *F. O. MacCallum.*

Fox (John P.), Lennette (Edwin H.), Manso (Caio) & Aguiar (Jacy R. Souza). **Encephalitis in Man following Vaccination with 17D Yellow Fever Virus.**—*Amer. Jl. Hyg.* 1942. Sept. Vol. 36. No. 2. pp. 117–142. [28 refs.]

Ever since the first isolation of the virus of yellow fever many different types of infected human and animal material, living and inactivated, have been used in an effort to produce immunity. Of course the ultimate aim has been to find a vaccine which would produce the maximum immunity with the minimum reaction. Some workers, chiefly French, used the so-called French neurotropic strain in the form of infected mouse brain. This produced a rather high proportion of benign reactions, and also a considerable number, approximately 12 per cent. in one group, of relatively severe and even occasionally fatal, reactions involving the central nervous system. For a number of years American and British workers used this strain also, but always accompanied by adequate quantities of immune serum. This latter method was replaced in 1937 by the use of an attenuated strain, known as 17D, which developed after repeated passage in tissue cultures of chick embryo tissue. The ability to produce fatal encephalitis in monkeys on direct intracerebral inoculation apparently had been lost, but encephalitis could still be produced in mice although after a somewhat increased incubation period. Careful observation of many thousands of inoculated individuals, chiefly in Brazil, revealed that about six to eight days after inoculation 5–10 per cent. developed slight headache, malaise and general body aches, but less than 0·25 per cent. were away from work for even one day.

Suddenly in July 1941 cases of definite encephalitis appeared among persons recently vaccinated against yellow fever by Fox and his colleagues. These cases followed the use of batches of vaccine made from several substrains of the original 17D virus in different localities. As well as the usual mild reactions on the sixth to eighth day, a certain number of inoculated persons developed more severe reactions, with signs of encephalitis, from the 10th to 21st days after inoculation. The percentage of these reactions and their degree of severity varied with the different batches of vaccine. In the area most extensively studied 0·5 per cent. of 55,073 persons vaccinated experienced these abnormally severe reactions, and one case was fatal. The severe reactions were more frequent among the younger age groups.

Thorough investigation indicated that the vaccine itself was responsible, and not any extrinsic agent.

The sudden alteration in character of the virus seemed to have occurred during a very small number of subcultures away from the parent strain. No suggestion is made of any factors which might have caused it. Fox and his associates have since altered their technique, so that all the vaccine used is initiated from primary and secondary seed batches of known character and adequate size, as recently described by them [above]. *F. O. MacCallum.*

SANDFLY FEVER.

PERFILIEV (P. P.) & PODOLJAN (V. J.). **The Prophylaxis of Phlebotomus Fever by Means of Sandfly Control in City Conditions.**—*Travaux Acad. Milit. Méd. Armée Rouge U.R.S.S.* Moscow. 1941. Vol. 25. [In Russian pp. 255–270. With 10 figs. English summary p. 271.]

" The prophylaxis of sandfly fever by control of the vectors is quite possible.

" The control should be developed in three directions :

" (1) A control of the larvae.

" (2) A mechanical protection of habitations from the entry of the sandflies.

" (3) Destruction of adult sandflies.

" In the control of the larvae it is not sufficient to clean the territory and sprinkle it with chloride of lime. The latter destroys only the larvae lying superficially, immediately touching them ; whereas the larvae are to be found not only on the surface of the ground, but often penetrate into the soil to different distances from the surface. Therefore a substance should be used penetrating actually into the soil, for instance benzene polychlorines widely applied in agricultural practice against harmful insects. After a single application of polychlorines—(reckoning 75 cc. to every square metre) the sandfly larvae are most perniciously affected for several weeks, which has been proved by tests especially carried out.

" For adult sandflies, the best way is to use flytox. For this purpose, in any territory where the anti-sandfly measures are being realized, one should have special staffs for the daily destroying of sandflies flying into the habitations. Special apparatus is used for this purpose : a flush of the fluid is directed against the sandflies sitting on the wall, in the corners and other places of habitation.

" A preliminary sprinkling of the walls with flytox has no practical importance because it evaporates very quickly and the remaining odour is too insignificant to repel the sandflies.

" Moreover, fly toxic fumigations with pyrethrum powder may be also applied, reckoning from 1·5 to 2·0 grams to every square metre.

" The control of sandflies regularly organized and carefully carried out in 1939 resulted in a decrease of morbidity with sandfly fever in the given territory. This was expressed in a decrease of the number of sick persons in the territory under test to 40–45 per cent. as compared with 1938, when no measures were taken against sandflies. Whereas in the neighbouring territories where the control of sandflies could not be undertaken in 1939, the morbidity with papataci fever, as compared with that of 1938, increased."

PLAGUE.

MOLL (Arístides A.) & O'LEARY (Shirley). **Plague in the Americas. X. Venezuela.**—*Bol. Oficina Sanitaria Panamericana.* 1942. Aug. Vol. 21. No. 8. pp. 780–785. With 1 map. [Refs. in footnotes.]

Most of the South American Republics have some noteworthy peculiarity in their relation to plague introduction. "Venezuela was, next to Bolivia, the last South American country to be invaded by plague (1908)". Some delay, as was almost to be expected, occurred over the primary recognition of the disease as such, but the infection appears to have been quickly eradicated from the ports of the country. It persisted in the interior. The statistical data of plague are not very convincing, and a footnote to this article states, with regard to one decade of disappearance of plague :—"At the time it was maliciously rumoured in Caracas that since the regime then in power was completing its first 10-year term in August 1919, its chief had ordered that plague should 'disappear' from the country. It is a fact, however, that the campaign against the disease had been pushed with vigor and skill." Hopes have once and again been raised in Venezuela that plague had truly disappeared, only to be dashed by its reappearance in epidemic form. The last of these epidemics seems to have occurred toward the end of 1939 and the beginning of 1940 in the State of Aragua. The features of Venezuelan plague differ little from those of the other South American republics. *W. F. Harvey.*

MACCHIAVELLO (Atilio). Bacteriologia general de la peste bubónica observada en el nordeste Brasileño. [**Bacteriology of Plague in North East Brazil.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 53–65. [18 refs.] English summary.

In this study the strains were 31 in number, derived from human cases, rats and fleas :—1 human septicaemic, 18 bubonic ; rats 10 and fleas 2. Strains obtained from inactive "cold inguinal bubo" (*ingua de frio*) and multiglandular plague are not included because these are dealt with separately. All the usual tests were applied and it was found that the Brazilian strains, all recently isolated, showed no significant differences between human, murine and flea strains nor did they differ essentially from European and American strains.

W. F. Harvey.

MACCHIAVELLO (Atilio). Bacteriologia de la ingua de frio. [**Bacteriology of the Cold Inguinal Bubo ("ingua de frio").**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 67–70. English summary.

Failure to isolate the plague bacillus from cases of *ingua de frio* had led to the supposition that these buboes might be referable to some other disease. The author has, however, isolated 8 strains of plague from this affection and has studied their bacteriological characters. This study has shown that except for some greater lability, difficulty of isolation and morphological fragility, the strains exhibited no characteristics sufficient to make them a special race or variant of *P. pestis*. The disease appears to be an attenuated form of bubonic plague. *W. F. Harvey.*

MACCHIAVELLO (Atilio). Bacteriología de la fiebre multiganglionar pestosa. [**Bacteriology of Multiglandular Plague.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 71–72. English summary.

The plague strains isolated in this affection do not differ fundamentally from other strains of North East Brazil. As for the organisms, *Klebsiella* and *Brucella bronchiseptica*, isolated from cases of multiglandular plague, they are identical with the same bacteria isolated from rats. There is no reason to refuse recognition of the multiglandular fever syndrome as a distinct clinical entity. A concomitant bacteraemia of non-plague type and not fatal would seem to be a possibility to be considered. *W. F. Harvey.*

MACCHIAVELLO (Atilio). Estudio sobre variación bacteriana de la *Past. pestis* con especial referencia a variaciones en morfologia, caracteres de las colonias, virulencia, toxicidad y propiedades bioquímicas. [**Study of Variability of the Plague Bacillus.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 73–102. [16 refs.] English summary.

Although these studies touch on the variability of plague bacilli in relation to biochemical characters, virulence, serology, sensitiveness to phagocytosis and formation of pigment, the main investigation and discussion has reference to the morphological variation of the organism and its colonies. Roughness and smoothness are specially considered and explanation is forthcoming to account for the diversity of opinion of many authors. The four strains included in the present study came from human cases of septicaemic and bubonic plague, *ingua de frio*, multiglandular plague; from rats dying spontaneously of plague, from sylvatic rodents and from fleas. A few laboratory strains completed the total. Most of the strains were freshly isolated and the media used in the morphological study of colonies were simple agar and sulphite agar.

The author concludes that environmental factors are decisive in obtaining unstable variants, of smooth, rough, or intermediate appearance, virulent or avirulent. The morphological variations in colonies were not acompanied by changes in biochemical properties nor was there always correlation between the rough or smooth appearance of the colony and virulence. It follows that the effectiveness of "dissociation" is not to be judged from the superficial smooth or wrinkled aspect of a culture. It does not seem possible to maintain with SCHÜTZE that *Past. pestis* is a bacterium which is constantly in the rugose phase. The author decides that it is not surface appearance which is most important as an index of virulence of a strain but the granular or homogeneous internal structure of the colony. This configuration is likewise related to other characters such as stability in saline suspension, agglutinability and sensitiveness to phagocytosis. The homogeneous and intermediate colonies—finely granular and also virulent—are unstable; the coarsely granular and avirulent are stable. This new way of looking at variation of the plague bacillus in regard to its structure and other variables, instead of the greater or less rugosity of the surface of its colony, explains in all probability the contradictory statements which have appeared in the literature. The smooth antigen, therefore, of the plague bacillus is an antigen of the deep structure and

is without influence on the morphology of colonies. An exception has to be made for dwarf colonies which are a truly smooth form of this organism. *W. F. Harvey.*

MACCHIAVELLO, Attilio. Variantes atípicas de *Pasteurella pestis*, aisladas en el nordeste del Brasil. [**Atypical Variants of the Plague Bacillus from N.E. Brazil.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 103–108. English summary.

In the course of this extensive study of the characters of the plague bacilli of north-east Brazil two strains have been isolated which are considered by the author to be true and stable mutations from the normal type. One of these two, 211 X, was isolated originally by puncture from a bubo in a human case of plague, the other 232 X, from the spleen of a rat dead of plague. These two strains were found to possess the same characters and to differ significantly from the organism of normal type. The investigation of characters comprised morphology of colonies, experimental inoculation, the morphology of the organisms in tissues and colonies, biochemical properties, agglutination and other serological tests. Differences were found in the appearance of some of their colonies, in the morphology of the bacteria, in their diminished biochemical activity, in the production of uniform turbidity in certain liquid media, in increased production of alkali in broth and milk, in their exaggerated tendency to agglutinate spontaneously in saline solutions even of low concentration, in the failure to form "enveloped" antigen at 37°C., in their serological relations with other strains, etc. *W. F. Harvey.*

MACCHIAVELLO, Attilio & PARACAMPOS, Helio. Sobrevida y virulencia de la *Past. pestis* en las condiciones ambientales de los trópicos. 1. En vísceras de animales encontrados muertos durante epizootias pestosas y en vísceras de cadáveres humanos. [**Viability and Virulence of *P. pestis* in the Tropics. 1. In the Viscera of Dead Animals and Man.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 109–117. [17 refs.] English summary.

It is very necessary to be aware of the effect of environmental factors on the plague bacillus, especially in tropical lands and where material may have to be sent from a distance to the laboratory for diagnosis. Factors which are unfavourable to the life of the organism, which come into play with the death of the animal or patient, and which are operative during the transit of material, may lead to what the author describes as false negatives in deciding the existence of plague epizootics or epidemics. The material examined consisted of liver or spleen and was embedded in paraffin for despatch according to the method of LONG, or suspended in glycerine (pure or diluted). In a certain number of cases the procedure was to make cultures on agar or sulphite agar and send these to the laboratory. The material thus obtained was inoculated into guineapigs. Sufficient simultaneous controls were instituted to afford comparison with normal favourable conditions. The author concludes that to a very large extent the environmental conditions—heat, desiccation, putrefaction and variations of humidity—are much more active in producing negative results in tropical than in temperate or cold climates. They do not therefore truly signify absence of plague

infection at the source. The best practical method of despatch in the tropics is cultivation from a large piece of test tissue sent in a tube. The simple and secure method of LONG is adapted to tropical conditions for a non-technical personnel. *W. F. Harvey.*

MACCHIAVELLO (Atilio) & PARACAMPOS (Helio). Sobrevida y virulencia de la *Pasteurella pestis*. 2. En organos de animales pestosos conservados en el frigorífico a 4°–10°C. o a 0°–5°C.—según los casos.—[**Viability and Virulence of *P. pestis*. 2. In Animal Organs kept in the Ice Chest.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 119–126. English summary.

The first experiments had reference to the comparative vitality of *Past. pestis* in spleen and liver of guineapigs and rats when kept in the ice chest for variable times up to four years. It was found that the bacilli were maintained alive better in the spleen than in the liver. Some laboratories do not recommend sending plague liver because the rapid autolysis which takes place destroys the plague organisms. In the case of Chilean strains it was possible to restore the virulence of bacilli which had become progressively attenuated in the spleen, if the time of preservation had not exceeded six months. Brazilian strains, on the contrary, lost their virulence much more rapidly, and this loss was often not reversible. It was shown that this loss of virulence did not depend—at least to any extent—on the action of cold (0°–5°C.) but upon factors relating to the organisms themselves or to the tissues of the animals inoculated. On the whole refrigeration of organs of animals is not recommended as a routine method of preserving the plague bacillus. *W. F. Harvey.*

MACCHIAVELLO (Atilio) & PARACAMPOS (Helio). Sobrevida y virulencia de la *Pasteurella pestis* (Cepas brasileñas). 3. En órgano de cobayos pestosos mantenidos en glicerina y conservados en el frigorífico a 0°–5° C. [**Viability and Virulence of *P. pestis*. 3. In Organs of Guineapigs kept in Glycerine at 0°–5°C.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 127–131. English summary.

In the tissues of plague guineapigs kept in 50 per cent. pure glycerine at 0°–5°C. the bacilli lose their viability and virulence progressively. Brazilian strains showed these changes earlier than other strains. The attenuating action was not due to the glycerine, nor yet to the cold alone, but could be observed in material not submitted to these conditions. This method of preservation is not to be recommended for preserving the viscera of plague animals. *W. F. Harvey.*

MACCHIAVELLO (Atilio). Sobrevida y virulencia de la *Past. pestis* (Cepas brasileñas). 4. Mantenidas en cultivos no repicados, el las condiciones ambientales de los trópicos. [**Viability and Virulence of *P. pestis*. 4. Kept in Cultures without Subculture under Conditions prevailing in the Tropics.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 133–141. [11 refs.] English summary.

It is important to know, in tropical countries, the extent to which the surrounding conditions affect the viability and virulence of cultures in

the course of transit to the laboratory. This was studied for *P. pestis* by cultivating the organism in solid and liquid media and keeping the cultures for variable periods at the temperature of the laboratory. Even after 284 days, by which time the solid media appeared to be completely dried up, it was possible to obtain living subcultures. The virulence undoubtedly diminished, but less than in "those cultures which under the same temperature conditions were repeatedly subcultured." The addition of blood to the medium notably protected the viability and the virulence. In liquid cultures the results were influenced by the composition of the medium. In this case sterilization, with negative subculture, appeared to depend on the concentration of toxic substances, catabolic or mineral. When viable subcultures were obtained from liquid media the virulence did not appear to be appreciably diminished, and this suggests that such loss in the case of solid media must be due to desiccation.

In practice it seems preferable to send material for diagnosis in the form of cultures instead of in the form of tissues or viscera.

W. F. Harvey.

MACCHIAVELLO (Atilio) & PARACAMPOS (Helio). Sobre vida y virulencia de las *Past. pestis* (Cepas brasileñas). 5. En cultivos no repicados durante 5 y 8 años, conservados por el método de A. de Assis. [**Viability and Virulence of *P. pestis*. 5. In Original Cultures not subcultured for 5 to 8 Years. Method of Assis.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 143–149. English summary.

Preservation of *P. pestis* in culture, whether kept in the ice chest or at low temperature; whether in sealed tubes, in phosphoric vacuum or frozen, has demonstrated the great vitality of this organism. Desiccation shortens the period of survival. The method of Assis, designed to prevent drying, consists in keeping the organism in stab culture under a layer of 1 to 2 cc. paraffin oil, and preserves the life of the bacillus kept either at room temperature or under optimum conditions. Virulence, however, is notably diminished and this contrasts with its preservation in the ice chest. In one of the experiments the organism, although attenuated, had its virulence raised to normal by passage through guineapigs.

W. F. Harvey.

JUNIOR (Marcelo Silva). Peste e seu diagnóstico no homem e nos roedores. Peste no homem. Tratamento. [**Diagnosis of Plague in Man and Rodents. Treatment.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 151–188. With 8 figs. & 1 chart. English summary.

This article is a detailed description of plague in its clinical, pathological and therapeutic aspects, with abundant reference to the views of well-known authorities. In particular a very useful differential diagnosis from tularaemia is given in paragraphs arranged in two parallel columns. The author commends the use of an intradermal reaction in the diagnosis of plague and describes the preparation of the antigen for this purpose :—A primary bubo from a guineapig inoculated subcutaneously with plague of the locality is boiled for two hours in normal salt solution. It is then ground up in normal saline in the

proportion of 1 gm. to 20 cc. and filtered through sterile gauze. Phenol (0·5 per cent.) is added and sterility is tested. The injection dose is 0·1 cc. *W. F. Harvey.*

LOWE (J.). **A Note on the Work of Dr. P. L. Simond on the Transmission and Epidemiology of Plague.**—*Indian Med. Gaz.* 1942. July. Vol. 77. No. 7. pp. 418–421.

BACILLARY DYSENTERY.

BRICEÑO-IRAGORRI (L.). Disenteria bacilar. [**Bacillary Dysentery (in Venezuela).**]—*Gac. Méd. de Caracas.* 1941. Dec. 15 & 31. Vol. 48. Nos. 23 & 24. pp. 365 372 & 1942. Jan. 15 & 31. Vol. 49. Nos. 1 & 2. pp. 2–9. [40 refs.]

[This article deals not only with bacillary dysentery but, in the first part at least, with dysentery in general, and the opening pages have more a historical than a purely scientific importance.] The author shows how vital a matter dysentery is in Venezuela. He divides the earlier times into three periods: (1) Before anything was known as to the real cause of dysentery. (2) From the discovery of the amoeba as a cause. (3) When causative bacteria began to be studied.

He next describes the various dysentery organisms, their biochemical reactions and their classification. He gives figures for 1938–40 to show the distribution of deaths from dysentery, amoebic or bacterial, and of unknown origin. Details are given for 20 districts, the totals being: In 1938, 202 amoebic, 32 bacillary, 163 unknown (together 397); in 1939, 204, 19 and 141 (364), and in 1940, 218, 24 and 143 (385) respectively, or 624 amoebic, 75 bacillary and 447 of undetermined cause [a proportion so large must detract from the value of the other figures as determining causation].

Next, he describes the result of a study of strains isolated in outbreaks in different parts of the country: In San Cristóbal and Táriba in the State of Táchira, La Victoria in the State of Aragua, and Tinaquillo in the State of Cojedes and Caracas. Altogether 127 strains were differentiated; of these 97 were *Bact. shigae*, 27 *Bact. flexneri*, 2 *Bact. sonnei*, and 1 *Shigella ambigua* (Schmitz's organism). Neither *Bact. shigae* nor *Bact. sonnei* was found in Caracas patients. The Schmitz organism was found in Tinaquillo. *H. Harold Scott.*

WALTHER (G.) & GÜNTHER (L.). Das Verhalten des Serumchlors bei Flexnerruhr. [**The Chloride Content of the Serum in Flexner Dysentery.**]—*Klin. Woch.* 1942. Aug. 15. Vol. 21. No. 33. pp. 726–729. [10 refs.]

The chloride content of the serum is affected in various ways in bacillary dysentery. As in other febrile conditions there is a tendency for the filtration of the chlorides out of the serum into the surrounding tissues, and in this respect vomiting and diarrhoea are decisive factors.

In 64 patients hypochloraemia was observed in 17 with a chloride content between 300 and 360 mgm. per cent. These were Flexner dysenteries; the results suggest the necessity for salt replacement by the mouth. Water loss causes plasma concentration and salt loss may

therefore not be apparent. Hypochloraemia can take place within 2–3 days, but may be deferred to the second week. During convalescence, on the other hand, frank hyperchloraemia is noted. Relapses and the supervention of complications, such as dysenteric arthritis, lead to a further chloride loss.

In 15 fatal dysenteries either no alteration in the chloride content or a moderate hypochloraemia was observed. It is surmised that this is due to toxic inhibition of some endocrine regulation of chloride metabolism.

The indications are, therefore, that by judicious dieting in food and drink this chloride loss may be averted. Intravenous injections of physiological saline in 10–20 per cent. solution in amounts of 20–40 cc. may therefore be given with benefit. *P. Manson-Bahr.*

POOLE (L. T.). **Dysentery and Diarrhoea in Wartime.**—*Brit. Med. Jl.* 1942. Oct. 10. p. 438.

Poole points out that the refined and standardized anti-Shiga serum now issued to the Army contains 50,000 International Units in a volume of less than 10 cc., and that 50,000 to 100,000 I.U. are considered sufficient as an initial dose even in fulminating cases. Intravenous injection is preferable to intramuscular, and as a result of the use of proteolytic enzymes in the preparation of this serum, the risk of anaphylaxis is so small that it need not be regarded as a deterrent to the intravenous route. *C. W.*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

DOBELL (Clifford). **Some New Methods for studying Intestinal Amoebae and other Protozoa.**—*Parasitology.* 1942. May. Vol. 34. No. 1. pp. 101–112. With 5 figs.

In his investigations of the intestinal protozoa of monkeys and human beings the author has adapted with advantage an old technique by laying a cover-glass on the surface of the solid slope of inspissated serum or eggs beneath the liquid portion of the medium used for cultivation of amoebae. The amoebae move on to the surface of the cover glass, which can be removed and dropped, as in the case of smears, on the surface of the fixative. By this means are obtained excellent preparations of the various intestinal amoebae fixed in their natural form during movement. Specially shaped cover-glasses and instruments for handling them are required. These and the various manipulations are described in detail with the aid of a number of figures.

The paper further describes two staining methods which have been modified for amoebae and other protozoa. Like the well-known iron haematoxylin method both these involve the use of mordants, but they have the advantage that after staining is completed there is no necessity to differentiate the films in the mordant solution, as overstaining does not occur. One of the methods—the tungstic haematoxylin method—involves the use of a 2 per cent. solution of phosphotungstic acid. In this strength of mordant films are left for ten minutes or

longer. They are washed in several changes of distilled water to remove excess of acid and then placed in a ripened 0·2 per cent. aqueous solution of haematoxylin for 15 to 30 minutes or longer. They are then kept in tap water till purple and mounted in the usual way.

In the second method—molybdic haematoxylin method—the mordant is a 2 per cent. solution of ammonium molybdate. The staining procedures are the same as in the first method.

Though these staining methods are evolved by the author for the study of amoebae and other intestinal protozoa, they are of general application and will be found useful for staining sections as well as films and for vegetable as well as animal tissues.

Three outline drawings from films of the common intestinal amoebae of man illustrate the good results obtained by the techniques described.

C. M. Wenyon.

SAPERO (James J.), HAKANSSON (Erik G.) & LOUTTIT (C. M.). **The Occurrence of Two Significantly Distinct Races of** *Endamoeba histolytica.*—*Amer. Jl. Trop. Med.* 1942. May. Vol. 22. No. 3. pp. 191–208. With 3 figs. [17 refs.]

From a study of the cysts of *Entamoeba histolytica* from 99 cases of infection with this amoeba the authors have demonstrated the existence of large numbers of strains having mean diameters intermediate between, and beyond, the five races postulated by DOBELL and JEPPS in 1918. These strains reveal a marked degree of overlapping in size distribution, do not show size constancy, and differ from one another in no other respect than that of size alone. On this account they cannot be designated as races of *E. histolytica.* A further analysis, of individual strains and of the pooled distribution of 7,495 cyst measurements from 320 cases, demonstrates the existence of two distinct races—one of large and the other of small cysts. These are distinctly unlike in size and differ in other respects—motility, cultivability, pathogenicity in man and experimental animals. The dividing line between these races is 10 microns for living cysts or nine microns for fixed and stained cysts. The evidence which the authors have reviewed in the paper indicates a racial constancy both as regards the size and the physiological characteristics exhibited by the two races of *E. histolytica.* The free forms of the small race have not been shown to ingest red blood corpuscles, and are less vigorously motile than those of the large race, while the cysts and the free forms are more uniform in size than those of the large race. The small race is less readily cultivated than the large race, while it is definitely less pathogenic to kittens. Tissue invasion in man by the small race has not been demonstrated nor has it been shown to be the cause of dysentery or other serious clinical condition.

C. M. Wenyon.

D'ANTONI (Joseph S.). **Amebic and Bacillary Colitis in the New Orleans Area. Preliminary Report.**—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 319–324. With 1 fig.

The routine employed in suspected cases of amoebic or bacillary dysenteries has been: A saline cathartic is administered on retiring and a sample of faeces is collected the following morning after 6 a.m. One and a half hours before sigmoidoscopy an enema of physiological saline is administered. After evacuation the saline enema is repeated

and a portion from the last part of this second enema is collected. Sigmoidoscopy is performed, the mucosa inspected, a glass tube introduced and material from suspected areas aspirated.

Fourteen patients positive for *E. histolytica* were studied. In 8 the organism was recovered from the purgative and enema specimens, whilst the aspirate was negative, but amoebic lesions were demonstrable in one only. Both aspirated material, purgative and enema specimens, were positive in two. In four *E. histolytica* was recovered only from the aspirate. The failure to detect *E. histolytica* in material aspirated from the rectum is commented on. Treatment of amoebiasis was with Diodoquin, three tablets three times daily for 10 days was inefficient and the course was increased to 20 days. A minimum of three negative stool specimens obtained two weeks after completion of treatment was the criterion of cure. In one case out of a series of 38 this treatment failed. Thirty-two individuals harbouring *Shigella* (dysentery bacilli) were detected. In 28 the intestinal mucosa showed reddened granular patchy areas, usually 2–4 cm. in diameter. In four it simulated early ulcerative colitis. Sonne's bacillus was the most frequent cause of bacillary dysentery in New Orleans. It is stated that sulphaguanidine is of value in the cure of acute bacillary dysentery, but failed in four out of five cases of *Shigella* colitis.

P. Manson-Bahr.

ORMISTON (G.), TAYLOR (Joan) & WILSON (G. S.). **Enteritis in a Nursery Home associated with** *Giardia lamblia.*—*Brit. Med. Jl.* 1942. Aug. 8. pp. 151–154. [15 refs.] [Summary appears also in *Bulletin of Hygiene.*]

There was an outbreak of chronic diarrhoea in a nursery home for evacuees between July 1940 and May 1941. Attacks started acutely with vomiting, dehydration, loss of weight, and pyrexia, which passed into a chronic phase, with watery mucus-containing stools, poor nutrition and an anaemia with mild eosinophilia; 28 out of 31 infants, and 16 out of 20 adults were affected. The adult patients complained in addition of colicky pains, giddiness, weakness, anorexia and headache. There were two deaths among the infants. No pathogenic organisms were isolated except *Giardia intestinalis* [*G. lamblia*], which was found in the stools of 82 per cent. of those who had, or had had, diarrhoea, and in only 25 per cent. of those who had not.

Quinacrine (atebrin) [mepacrine is the British equivalent] produced a rapid and complete cure, with disappearance of the Giardia and recovery from the symptoms. It was given in tablet form, 0·1 gm. three times a day for five days. Infants under two years old were given one-sixth of the dose. A second course of treatment was given four days later for safety.

It seems likely that Giardia may be a more common cause of diarrhoea than is suspected, especially of chronic "non-specific" cases appearing in the winter.

Charles Newman.

PANT (K. C.) & RAY (H. N.) **Quinacrine in the Eradication of** *Giardia lamblia* **Infection.**—*Indian Med. Gaz.* 1942. Aug. Vol. 77. No. 8, pp. 469–470.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

ADLER (S.) & ASHBEL (Rivkah). **The Behaviour of** *Spirochaeta persica* **in** *Pediculus humanus.*—*Ann. Trop. Med. & Parasit.* 1942. Sept. 30. Vol. 36. No. 3. pp. 83–96. [11 refs.]

A description of experiments to determine whether the Palestinian strain of relapsing fever, *Spirochaeta persica*, usually transmitted by the bite of the tick *Ornithodorus tholozani*, could also be transmitted by *Pediculus humanus*.

The histories of 65 cases of the disease showed that in the great majority the first attack occurred within 10 days of a visit to some cave, where ticks are liable to occur, but four acquired the infection in the Old City Quarter of Jerusalem and the possibility of louse transmission had to be considered. Infectivity for guineapigs is a simple practical test for distinguishing between tick- and louse-borne spirochaetes; whenever *S. recurrentis* has been tested, it has been found non-infective for guineapigs. Out of 42 strains of spirochaetes in Palestine and Syria, 40 produced a heavy infection in guineapigs, one was only slightly infective, and one was almost non-infective. All the strains examined were uniformly infective for rats.

Five strains of spirochaetes, all from human cases, were investigated and showed considerable diversity in different strains of lice. When ingested by lice in large quantities the spirochaetes all disappeared, and inoculation of the lice into susceptible animals gave negative results. When inoculated into the coelom of the louse they survived for various periods; one strain for less than 24 hours, a second strain up to three days, and a third strain up to seven days. One strain of spirochaete, however, when ingested by lice survived up to 10 days, as proved by inoculation into susceptible animals. In no case was there any evidence of multiplication in the coelom of infected lice.

The gradations in the length of survival of the spirochaetes in the louse is in accordance with NICOLLE and ANDERSON's suggestion [see this *Bulletin*, 1927, Vol. 24, p. 77] that the contemporary strains of *S. recurrentis* were originally derived from tick-transmitted strains. Up to the present, however, no tick strain capable of multiplying in the coelom of lice has been discovered. In Palestine, where tick-transmitted relapsing fever is endemic, not a single case of undoubted natural louse-transmission has been seen during the past five years.

A strain of *S. persica* was rapidly destroyed in the monkey louse, *Pedicinus eurygaster*, although in one experiment infection resulted when specimens were removed from a monkey, whose blood was swarming with spirochaetes, and immediately inoculated into another monkey. Similar experiments with guineapigs gave negative results.

E. Hindle.

ASHBEL (Rivkah). **Observations on Some Strains of** *Spirochaeta persica* **in Palestine.**—*Ann. Trop. Med. & Parasit.* 1942. Sept. 30. Vol. 36. No. 3. pp. 97–101.

A study of the behaviour of 17 strains of *S. persica* in 110 guineapigs, which had each recovered from infection with a single strain, with special reference to the period of survival in the brain.

At varying intervals, up to 840 days after the blood was finally negative, the animal was killed and the whole brain emulsified and inoculated into normal guineapigs. With one strain positive results were obtained 398 days after apparent recovery, and with other strains

from 117 to 264 days. Ten animals, 400 to 804 days after recovery, were negative ; also in some cases after slight infections the brain was negative as soon as 31 to 60 days after the blood infection.

No immunological changes were observed in the spirochaetes as a result of repeated passages through rats and guineapigs. The authors found that relapses in human beings can occur both with and without immunological changes in the spirochaetes, even in the same individual, as shown by the results of cross-infection experiments.

In some cases a relapse-strain protects completely both against itself and against the original strain, though the original strain does not protect against the relapse strain. This indicates the presence of antigens common to both strains, and new antigens in the relapse strains.

These mutations in spirochaetes have been observed, not only as a result of passage through man, but also in monkeys and in one instance the tick, *Ornithodorus tholozani*. *E. Hindle.*

TRIMARCHI (Michelangelo). Su un caso di pseudo addome acuto da ricorrente. [**A Case of Relapsing Fever in which the Acute Abdomen was Simulated.**]—*Boll. d. Soc. Italiana di Med. e Igiene Trop.* (Sez. Eritrea). 1942. Vol. 1. No. 2. pp. 93–95. English summary (5 lines).

MOUSTARDIER (G.). Premier cas de sodoku observé en Afrique Equatoriale Française. [**The First Case of Sodoku observed in French Equatorial Africa.**]—*Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* Brazzaville. 1942. July. Vol. 1. No. 1. pp. 5–15. With 1 chart.

The record of a fatal case of rat bite fever occurring during 1940, in a European at Brazzaville, who was bitten by a rat.

After an incubation period of 15 days the patient developed febrile symptoms which lasted four or five days ; this was followed by an interval of five days after which the temperature again rose to 40°C. In view of the clinical symptoms and history of the case, treatment with novarsenobenzol was started, and the patient's blood was inoculated into guineapigs and white mice, which subsequently showed the presence of *Spirillum minus* in the peritoneal cavity. [See below.]

In spite of all treatment the patient's condition gradually got worse, haemorrhagic symptoms developed, and he succumbed after an illness of about five weeks.

[This paper, apart from its subject matter, has the additional interest of being the first article in a new journal published in Brazzaville by the Free French in Africa. The Bureau would like to join General SICÉ in wishing it every success.] *E. Hindle.*

CECCALDI (J.) & GUILHAUMOU (F.). Isolement d'une souche humaine de *Spirillum morsus muris* à l'occasion du premier cas de sodoku observé en Afrique Equatoriale Française : son étude. [**The Isolation of a Human Strain of *Spirillum morsus muris* from the First Case of Sodoku observed in French Equatorial Africa : its Study.**]—*Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* Brazzaville. 1942. July. Vol. 1. No. 1. pp. 16–38. With 2 charts. [16 refs.]

A description of a strain of *Spirillum minus* isolated from the blood of a European in Brazzaville, 28 days after he had been bitten by a rat.

Two mice inoculated with the blood showed spirilla after 12 and 13 days respectively, and a guineapig after 17 days.

The pathogenicitiy of the strain was tested in mice, guineapigs, rabbits, three monkeys belonging to different species of Cercopithecus, a dog, cat, and fowls, all of which were susceptible. With regard to mice, one of the infected individuals gave birth to three young 24 days after being inoculated. Although spirilla were seen repeatedly in the blood of the mother, the three young remained negative and showed no other signs of infection.

The rabbit was found to be particularly susceptible, and in this animal the infection became generalized; *Cercopithecus neglectus brazziformis* and the fowl were also susceptible. These facts suggest that the strain possessed a very high virulence. Attempts to cultivate the organism on Reiter and Ramme's medium were unsuccessful. When inoculated into guineapigs simultaneously with *Trypanosoma gambiense*, the appearance of trypanosomes in the blood was delayed, suggesting an antagonistic action between the two infections. [See this *Bulletin*, 1942, Vol. 39, p. 345.] *E. Hindle.*

NITTI (F.), BOYER (F.) & CONGE (M.). Action du *p*-amino-phényl-sulfamide dans le sodoku expérimental du cobaye. [**The Action of *p*-amino-phenyl-sulphamide in Experimental Rat-Bite Fever.**] —*Ann. Inst. Pasteur.* 1942. Sept.–Oct. Vol. 68. Nos. 9–10. pp. 497–498.

The authors report promising results in a small series of experiments. *C. W.*

LEPROSY.

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION (INDIAN COUNCIL). **Annual Report 1941** [COTTER (E.), Chairman, Governing Body].—75 pp. With 3 figs. on 2 plates. Calcutta: Baptist Mission Press.

1. *Report of the Governing Body.*—This report deals firstly with the work of the central committee in the control of research work at Calcutta Leprosy Research Department. Papers on this work have already been reviewed in the *Bulletin*, and are concerned mainly with investigations of the lepromin test and with epidemiological studies at the Bankura centre and elsewhere.

2. *Report of Committee of Central Advisory Board of Health of Government of India on Leprosy and its Control in India.*—This is the first such enquiry since the Leprosy Commission of 1890, on which the Indian Lepers Acts of 1898 was based, so the time was fully ripe for its work. The following findings are summarized in this report. The formation in 1925 of the Indian branch of B.E.L.R.A. greatly stimulated interest and work on leprosy. The 1931 census figure of 150,000 cases is only about one-eighth of the actual number when early cases are included; in some areas the incidence may be 5–10 per cent. The charitable money given by the people to begging lepers would go a long way towards financing effective measures for the control of the

disease. Such social defects as overcrowding, bad housing, debilitating diseases, ostracism and ignorance on health matters make the problem largely an economic one. Instruction on leprosy in the medical curriculum is deficient, and medical institutions often refuse to treat leprosy patients. The central Government interests itself in research and the provincial health authorities in anti-leprosy work. The Mission to Lepers institutions are giving increasing attention to training in anti-leprosy work and in treatment. Treatment plays a larger part than clinical results alone would indicate, but better staffing of clinics is desirable. Infective cases in India are roughly estimated at 250,000, and only about 14,000 are accommodated in institutions, including a large number of uninfective crippled nerve cases. It is advised that the latter should be dealt with separately from the infective class, and a large increase of accommodation for the latter should be provided by the provincial authorities. In isolation at home the most important aim is the protection of children from infection. Leprosy clinics have the advantage of cheapness and under a keen specially trained doctor they do good work ; some of the best clinics are attached to in-patient institutions. The voluntary system of isolation should be relied on as hitherto, except in the case of beggars and of infective patients unwilling to isolate themselves. In-patients cost at least 12 rupees per head per month (£10 to £11 a year). Every province should have a central model leprosy institution as the hub of anti-leprosy activities. [This was advocated by the reviewer at a Calcutta Leprosy Conference in 1920.]

3. *Part* 2. *Reports of Provincial and State Branches.*—The following points are of more than local interest. In Madras the Government have accepted the principle that treatment of leprosy patients shall be provided at all hospitals and dispensaries. Investigations are carried out under the direction of Dr. R. COCHRANE at the Lady Willingdon Leprosy Sanatorium ; they deal mainly with the disease in children. More than 50 per cent. of nerve cases show improvement over a period of four years. In one village nearly all the infective cases are isolated locally. The Madras province has 470 leprosy clinics, Bengal has 139, and surveys in the latter revealed that, of persons examined, 0·44 per cent. of children, 2·4 per cent. of the police force, and 2·2 per cent. of prisoners in the jails examined showed signs of leprosy, practically all in a mild form. A survey in Calcutta showed nearly 1,000 begging lepers and a total estimate of nearly 10,000 cases in the general population. In the Central Provinces and Berar there are seven in-patient institutions, most of which have now agreed to take in only infectious cases ; an important advance which other provinces might well imitate. Out-patients are treated at 31 clinics and 58 sub-centres. In some areas home isolation is attempted by the people. Orissa has a high leprosy incidence for which two in-patient institutions and 147 clinics are provided. Surveys have already enumerated about 10,000 cases. The United Provinces have a lower incidence [and lower rainfall] ; two in-patient institutions and a number of hospital and skin clinics care for the cases. The Punjab is lightly affected except in such hill areas as the Kangra Valley. Five leper homes and 185 treatment centres are at work and surveys are carried on. Bombay has 14 leprosy institutions and 46 treatment centres. Bihar is another area with a high incidence of leprosy ; there are 9 in-patient institutions, 21 special leprosy clinics and 29 attached to hospitals. A survey revealed 2·4 per cent. of the population to be infected. *L. Rogers.*

GEHR (Emmo). Die Lepra in den Balkanländern. [**Leprosy in the Balkans.**]—*Deut. Trop. Ztschr.* 1941. June 15 & July 1. Vol. 45. Nos. 12 & 13. pp. 353–369; 385–403. With 11 figs. [125 refs.]

This and the following paper are written in continuation of the attempts made in two earlier papers by the same authors [see this *Bulletin*, 1940, Vol. 37, p. 626] to support the speculation of OBERDÖRFFER and GEHR [see this *Bulletin*, 1941, Vol. 38, p. 22] that the history of leprosy in Europe and its present incidence in that and other parts of the world can best be explained on the supposition that most leprosy infections arise as the result of the predisposing action of sapotoxins contained in colocasia (yams) in warm climates, or corncockle in Europe, both common articles of diet. The paper opens with a statement that the inquiry into the epidemiology of leprosy in the Balkans has been made to ascertain if it corresponds to Oberdörffer's views.

The incidence of leprosy in Greece is first dealt with and is illustrated by a map; other maps showing climatic conditions are given. The well-known high incidence in Crete and some other islands, and the lower rates on the mainland are pointed out. The total known cases are given as 758 and the distribution of 700 of these is tabulated. There are 279, or one-third, in Crete and five-sevenths in all the Islands, leaving 195 on the mainland, mainly in the Peloponnese. The males number 370 and females 330; 367 are interned and 333 remain free. A table of occupation shows 150 peasants and 40 labourers, including 10 workers with tobacco, as the largest classes. There were further cases in the families of 167 out of 700, the relationships being shown in another table; the most frequent being in brothers and sisters in 40 per cent. and parents in 41 per cent. The people are mostly very poor and 5 to 8 persons may sleep in one room. The tobacco growing areas have fewest cases. Beriberi is unknown, so lack of vitamin B_1 is excluded as a predisposing cause. The peasants live largely on vegetables and consume little meat, and it is stated that their bread may contain as much as 8 to 10 per cent. of corncockle seed. Other predisposing factors are discussed and the author excludes, to his own satisfaction, all the predisposing causes of leprosy recognized by other workers, including climatic conditions, poverty, overcrowding, unhygienic conditions, infection with malaria and other debilitating diseases. The expected conclusion is thus arrived at that only the consumption of sapotoxin-containing foods accounts for the distribution of leprosy in Greece and the other Balkan States, and that it acts by injuring the endocrine functions of the body. This, it will be recalled, was the hypothetical basis of treatment with diphtheria toxoids on which Oberdörffer and his colleagues in Thailand relied, which has failed in the hands of others, and for which no pathological basis has been demonstrated. Only brief consideration is given to leprosy in the other Balkan countries, including the following numbers known in each: Rumania 140, with an estimate of 500 to 600, Bulgaria seven cases, Yugoslavia 593, and Montenegro 100. One hundred and twenty-five references to literature are given; these do not include the paper by LOWE and CHATTERJI [this *Bulletin*, 1939, Vol. 36, p. 1015] in which those authors record facts in disagreement with Oberdörffer.

L. Rogers.

GEHR (Emmo) & GEHR (Elisabeth). Die Lepra in Spanien und Portugal. [**Leprosy in Spain and Portugal.**]—*Deut. Trop. Ztschr.* 1941. Nov. 15 & Dec. 15. Vol. 45. Nos. 22 & 24. pp. 673–685; 721–730. With 7 figs. [64 refs.]

The introduction, argument and conclusions of this paper are similar to those of the above on leprosy in the Balkans; only the data regarding the prevalence of the disease, therefore, require brief mention as they are very similar to those of previous authors on the subject. The known cases number 928, of which 486, or 52·4 per cent., are isolated, mostly at Fontilles in Alicanti province. The health authorities estimate the total number at from 2,500 to 2,000, and a dermatologist puts them at 6,000. The disease is most frequent in the Southern and Mediterranean provinces and in Galicia in the north-west of the peninsula. The classified cases show 344 to be nodular, 125 nerve, and 245 of a mixed type. A table of the vocations of the patients shows the largest numbers to be peasants 157, house workers 112, and day labourers 74.

The second part of the paper deals with the incidence of leprosy in Portugal. A table of known cases shows the distribution of 1,124 cases, of which the highest number, 234, or 0·6 per mille of population, are in the Coimbra district. The true total has been estimated at 3,000 to 4,000. A number of cases occur in persons who have returned from Brazil. *L. Rogers.*

HELMINTHIASIS.

ERHARDT (Albert). Chemotherapeutische Untersuchungen mit 430 Kl, einem Spezificum mit grossem therapeutischem Index, gegen die Ancylostomiasis, Trichuriasis, Ascaridose und Taeniose (Taenia- und Dipylidiuminfektion) der Katze. [**Chemotherapeutic Researches with 430 Kl, a Specific with a High Therapeutic Index, against Ankylostomiasis, Trichuriasis, Ascariasis and Taeniasis (Taenia- and Dipylidium Infection) of the Cat.**]—*Deut. Trop. Ztschr.* 1941. Aug. 1. Vol. 45. No. 15. pp. 449–456. [11 refs.]

While testing a large number of preparations made by Knoll A.-G. of Ludwigshafen am Rhein, Erhardt found that the substance called 430 Kl, the nature of which is not specified, was a specific with a high chemotherapeutic index for all the intestinal helminths of the cat, and he refers to it as a universal worm remedy. He says that LAMSON, BROWN and HARWOOD in 1934 [this *Bulletin*, 1935, Vol. 32, p. 237] tested a similar substance *in vitro* on *Ascaris lumbricoides* of the pig, a method which is not, in Erhardt's opinion, useful for the discovery of anthelmintics.

All Erhardt's experiments were done on cats with chronic natural infestations. Helminths such as Opisthorchis in the liver and pancreas of the cat and Strongyloides in its intestinal wall, *i.e.* helminths which are in the tissues, are not affected by 430 Kl, which is not absorbed into the blood. A later paper will describe its action on Oxyurids of rabbits. The action of the drug was tested by making egg counts on 24-hour samples of faeces, from an emulsion of which 0·075 cc. were put into Zschucke's counting chamber, the eggs in this being counted, so that

the total number of eggs passed during the 24 hours could be estimated. The drug was always given with tragacanth and water by means of an oesophageal sound. The lethal dose was 2 cc. per kgm.

The results of the treatment of 22 cats infested with *Ancylostoma caninum* showed a chemotherapeutic index of 1 : 20, which is a great advance on known anthelmintics. The worms were killed within 24 hours. The lowest effective dose was 0·1 cc. per kgm. and this could result in eradication of all the worms, although 0·2 cc. per kgm. killed only 80 per cent. of the worms in some cases.

Nine cats were treated for infestations with *Trichuris serrata.* The lowest effective dose was 0·05 cc. per kgm., which killed all the worms, giving a therapeutic index of 1 : 40. This is noteworthy, because Trichuris resists worm remedies.

Toxocara cati was treated in 47 cats. The lowest effective dose was 0·5 cc. per kgm., which killed all the worms in over 50 per cent. of the cats, giving a therapeutic index of 1 : 40.

Taenia taeniaeformis was treated in 22 cats. Doses of 0·1, 0·2 and 0·5 cc. per kgm. killed all the worms in 100 per cent. of the cats ; in one cat 0·05 cc. per kgm. killed all the worms, giving a therapeutic index of 1 : 20. Only eight cats infested with *Dipylidium caninum* were available, but in these the chemotherapeutic index was also 1 : 20.

Dead worms of all these species were found, after treatment, in the gut or in the faeces, but the author does not state how he decided that they were dead, although some of the ascarids in the faeces were, he says, partially digested. *G. Lapage.*

EICHHOLTZ (F.) & ERHARDT (A.). Wurmmittel. Der Nachweis ihrer Spezifität im chemotherapeutischen Versuch unter besonderer Berücksichtigung des Phenolabkömmlings 430 Kl (Knoll). **[Anthelmintics. The Proof of their Specificity by Chemotherapeutic Experiment with Special Consideration of the Phenol Derivative 430 Kl (Knoll).]**—*Deut. Trop. Ztschr.* 1942. June 1. Vol. 46. No. 11. pp. 275–284. [25 refs.]

In 1927 Eichholtz discovered a derivative of resorcin named E 1750, which seemed to have a good effect on ascarids of the cat. It is closely related to hexylresorcinol introduced almost simultaneously in America by LAMSON and his co-workers. E 1750 was tried by ZSCHUCKE in Fernando Po and by ZSCHUCKE and SZIDAT and WIGAND on man in the worm-infested regions on the borders of the Curische Haff near Königsberg on the Baltic. It had a very good curative effect on Necator, Ancylostoma and Ascaris of man, but it was only 50 per cent. effective against Trichuris of man and was no use against tapeworms, especially Diphyllobothrium. It was, therefore, not the universal anthelmintic desired. The end product of fifteen years of work by Eichholtz and Erhardt and their co-workers is the phenol derivative 430 Kl. During this fifteen years of work they have used cats as test animals, having come to the conclusion that dogs are not suitable, and still less the so-called *in vitro* methods. The helminth infestations of dogs are not established firmly enough ; even change of diet or simple remedies, such as turpentine, which are quite inactive in man, will remove many species of helminths from dogs, while the intestinal parasites of cats are difficult to eradicate.

After 15 years of work with cats they think that *Ancylostoma caninum* is primarily a parasite of cats and only secondarily one of dogs. They

found that the cats of some villages of one Heidelberg district were heavily infested with *Ancylostoma caninum*. In 1933–1937 Erhardt, using his new test methods for ankylostomiasis, found that only 10·3 per cent. of the cats in these districts were infested, but to-day nearly 100 per cent. have the infestation.

The remedies tried, in order of effectiveness, are as follows:—

Drug	Therapeutic Index	Lethal dose, per kgm. cats	Therapeutic dose per kgm. cats	Full therapeutic dose (man) [not per kgm.]
430 Kl ...	1 : 10–1 : 20	2 cc.	0·1–0·2 cc.	Not known
E 1750	1 : 4 [1 : 6 in table 1]	2·4 gm.	0·4 gm.	3–6 gm.
Filmaron oil 10 per cent.	1 : 2–1 : 6·6	3–10 cc.	1·5 cc.	10–20 gm.

Only these three drugs would kill 100 per cent. of the ancylostomes when they were given in therapeutic doses. To kill 100 per cent. of ancylostomes with ascaridol, toxic doses were required, and a kill of 100 per cent. was not possible with carbon tetrachloride, tetrachlorethylene or thymol. Santonin and Lubisan were completely inactive against ancylostomes of the cat.

Comparing these results with those obtained in human ankylostomiasis the authors conclude that in general the results obtained with the cat apply also to man, but the relatively feeble action of carbon tetrachloride, tetrachlorethylene, thymol and hexylresorcinol on the hookworms of cats shows that these are more difficult to kill and remove than the ankylostosomes of man. This is one reason why it is an advantage to use the cat as a test animal, because it prevents overestimation of the action of a drug and avoids estimating its activity on infestations with species that are not firmly established.

Human and cat ascarids are relatively easily removed. In cats, ascaridol, santonin and 430 Kl are specifics against ascarids (Toxocara). Ascaridol is also active against Ancylostoma and to a less degree against Enterobius, while santonin acts only on the ascarids. Tetrachlorethylene, E 1750 and hexylresorcinol are less useful against ascarids and carbon tetrachloride, thymol and Lubisan are only feebly active against them. Filmaron is completely inactive, even in doses of 10 cc. per kgm.

In man, as in cats, ascaridol and santonin seem to be the most active drugs against ascarids. Hexyl resorcinol, E 1750 and tetrachlorethylene are less useful, while thymol, carbon tetrachloride and Lubisan act only feebly. It is thus not too risky to apply the results obtained with ascarid infestations of cats to those of man, but it is not wise to compare the Taenia infestations of man and cats, because cat tapeworms are easily expelled, the Filmaron therapeutic index being, for example, strikingly higher in cats than in man, and E 1750 having a therapeutic index of 1 : 24 in cats, while it is no use for Taenia infestations of man. Filmaron is a specific against Taenia of cats. After 0·25 cc. per kgm. 100 per cent. of this species are killed and expelled with the scolices, while after 0·1 cc. per kgm. the worms are expelled without the scolices

and the first 2–3 cm. of the proglottid chains. E 1750, 430 Kl, tetrachlorethylene, thymol and hexylresorcinol were less active, and carbon tetrachloride, santonin and Lubisan were quite inactive.

To find a universal anthelmintic, herbivora as well as carnivora must be studied. The relative shortness of the gut of cats may lead to too high an estimation of remedies, which might be less effective in the longer guts of man and herbivora. For this reason a study of the action of the drugs mentioned on the oxyurid *Passalurus ambiguus* of the rabbit was undertaken. Further, human reactions to toxicity are more like those of the cat than those of the rabbit and herbivora are much less sensitive to toxicity. All the drugs mentioned above had a small therapeutic range against this oxyurid. Lubisan was the best of them. Other so-called remedies for oxyuriasis (Helminal, Butolan, aluminium acetate and Pyrethrum extracts) were all inactive or practically so against *Passalurus ambiguus.*

The authors claim that their results show that santonin alone shows an absolute specificity, being active against ascarids only. Most of the other drugs mentioned above acted on two or three species of helminths and were, therefore, only relatively specific. For helminths of the cat 430 Kl is a universal remedy, but among its disadvantages are the facts that it is chemically unstable, has an almost intolerable taste, and markedly irritates the buccal and pharyngeal mucous membrane, just as resorcin derivatives do.

The authors express the hope that drugs will be found which are more active against Ancylostoma and Enterobius and are less toxic.

G. Lapage.

DE PAULA (Hermes). Incidencia de verminose em escolares. [**Incidence of Helminths in School Children of Montes Claros, Minas Gerais.**]—*Brasil-Medico.* 1942. May 23 & 30. Vol. 56. Nos. 21 & 22. pp. 271–272.

MINNING (W.). Immunbiologische Nachweismethoden bei Bilharziosen. [**Immunological Methods for the Diagnosis of Bilharzia.**]—*Deut. Trop. Ztschr.* 1941. June 1. Vol. 45. No. 11. pp. 321–323.

Complement fixation and skin tests can be of considerable value for the diagnosis of isolated cases of bilharzia in Germany and of infestations which have existed for a long time, although eggs cannot always be found ; but precipitin reactions are not.

Two kinds of antigen can be used, namely, extracts of mature schistosomes in alcohol or salt solution and extracts of the digestive glands of snails infested with the larval forms. Extracts of the organs of the final host while it is harbouring the eggs and the products of intestinal reaction to the parasite could also be used, but such an extract from the livers of experimental animals proved to be useless.

Worm extracts are not practicable, because of the difficulty of getting enough mature worms. Worm extracts in salt solution have a sufficient titre and are also specific, but the titre falls rapidly when phenol is added, so that they cannot be used for long (see note below). Alcoholic worm extracts also have a constant and sufficient titre, but they tend to give pseudo-positive reactions.

Extracts of the digestive glands of snails give good results and there is no great difficulty in getting infested snails in bilharzial regions.

Only the alcoholic extract is useful. FAIRLEY showed that its active constituent is a lipoid or a lipoidal complex and Fairley's quantitative complement estimation makes possible accurate observations on the variations in the antibody titre. Fairley thinks that it is a true antibody-antigen reaction. Minning, by repeated injections of the extract of the digestive glands of infested snails into normal goats, was able to obtain positive complement fixation and in infested goats a leap up in the complement fixation titre. *Rhesus* monkeys, into which the substance of schistosomes was injected for eight months, were not positive, but it is known that different experimental animals can behave differently as regards antibody formation in active immunization. Work on infested monkeys also showed that there is no parallel between the titre of the complement fixation and the degree of acquired immunity against *S. japonicum.*

The complement fixation reaction shows a marked group specificity within the genus Schistosoma.

Minning used alcoholic extracts of the digestive glands of *Planorbis guadeloupensis* (*P. glabratus*) infested with *S. mansoni* and these reacted, not only with sera from patients infested with *S. mansoni*, but also with those of patients infested with *S. haematobium* and *S. japonicum.* Extracts of non-infested *P. glabratus* gave, in both Fairley's and Minning's work, negative reactions with the positive sera. With these alcoholic extracts monkeys infested with *S. japonicum* were negative before infestation, but 2–3 weeks after infestation they were positive, the reactions reaching their highest point 2–3 months after, when, in spite of continued infestation, the titre fell until it was negative two years after the first infestation. Out of 97 patients free from bilharzia, all but two were negative with these alcoholic extracts and these two had positive syphilitic reactions. Only a few sera of patients suffering from bilharzia were available; but two of these with active infestations with *S. haematobium* showed a rise in titre at the same time as a rise in eosinophils; one with an inactive *S. haematobium* infestation was as strongly positive when no eggs could be found; and, after treatment, the complement fixation capacity of the serum was markedly reduced; one with an active infestation with *S. mansoni* was positive. Repeated tests on sera of six patients who had been infested in 1934 were negative.

Skin tests were more valuable than the complement fixation tests. For these worm extracts were made by Bozicevich's method for making *Trichinella spiralis* antigen. In patients free from bilharzia there were no non-specific reactions. In bilharzia cases there appeared, after injecting dilutions of 1 in 10,000 to 1 in 40,000 into the skin, a primary reaction, *i.e.* a weal 10–12 mm. in diameter with marked redness round it. Only once was a secondary reaction seen after 24 hours.

Active cases of *S. haematobium* infection and patients in whom eggs could not be found reacted to 1 in 20,000 and so did cases of *S. mansoni* infection, although some of these were negative to 1 in 10,000. The six cases mentioned above with negative complement fixation reactions which showed eggs only at times, were positive to dilutions of 1 in 20,000.

[Bozicevich makes Trichinella extracts with saline and does not use Coca's solution; Trawinski describes a similar method and thinks that the phenol in Coca's solution causes false positives.] *G. Lapage.*

BYRD (Elon E.). **The Opossum,** *Didelphis virginiana* **Kerr, a New Host for Paragonimus in Tennessee.**—*Science.* 1941. June 6. Vol. 93. No. 2423. p. 542.

Twenty specimens of a fluke identified tentatively as *Paragonimus westermanii* were found in the lungs of an opossum from a station in Tennessee. Byrd holds that there exists only one species of Paragonimus; so far as is known the opossum has not previously been recognized as a host, and the American opossum has, in fact, been found refractory to experimental infection. *C. W.*

BACIGALUPO (Juan). Fasciola hepática L. Su ciclo evolutivo en la República Argentina. Distomatosis hepática. [*F. hepatica*; **Cycle of Development.**]—*An. Facul. de Vet.* Montevideo. 1942. June. Vol. 4. No. 1. pp. 9–134. With 77 figs. [52 refs.]

GOTOR (P.). El diagnóstico de la cisticercosis cerebral. [**The Diagnosis of Cerebral Cysticercosis.**]—*Rev. Clin. Española.* 1942. Jan. 30. Vol. 4. No. 2. pp. 121–123. With 2 figs.

The author has encountered two cases, the first of which was described in the *Archivos de Neurobiologia* (1939, Vol. 10, p. 147). The second is here described and the differential diagnosis is discussed. This patient was a boy, aged 8, whose history revealed nothing of interest. His illness began three years before admission to the clinic after a series of attacks of headache and vomiting. A progressive loss of sight ended after three months in complete blindness, an uncommon symptom of cerebral cysticercosis, which, in this patient, might have been due to cysticercus toxins or to basal meningitis or eye lesions. Although the mother said that pieces of tapeworm had been passed, treatment before admission to the clinic did not completely eliminate the worm, but repeated examination at the clinic before, during and after administration of filmaron failed to reveal tapeworms or their eggs.

The intention to radiograph the patient precipitated in him a state of great excitement and a very atypical convulsive crisis recalling the "tempest of movements" described by KRETSCHMER. Similar attacks had occurred earlier. There was some emotional instability, but no evidence of epilepsy. At most the patient exhibited attacks suggesting hysteria.

Prolonged observation indicated that the symptoms had moderated, but there was some exophthalmos and this was said to have been worse at the beginning of the illness. Midriasis, nystagmus and simple atrophy of the papilla were present. The principal features of the blood examination were an eosinophilia of 3 per cent. only, a relative lymphocytosis of "42" [presumably 42 per cent.] and a very strongly positive complement fixation reaction with cysticercus antigen. This reaction was negative with the cerebrospinal fluid. The Wassermann reaction was negative.

Only exceptionally have pieces of cysticercoid membrane or many small vesicles been found in the spinal fluid, which usually shows high pressure and a picture differing little from that of chronic encephalomyelitis. In Gotor's first patient it showed a picture like that described by GUILLAIN, PÉRON and THÉVENARD, but in his second patient it was normal.

There is a tendency to attach too much importance to eosinophilia of the blood. BUSÉ found eosinophilia in only 50 per cent. of his cases and the eosinophilia was not high; the maximum both in his cases

and in the literature reviewed by SCHENCK was only up to 12 per cent., but cases of Echinococcus infestation were included in these figures.

Eosinophilia of the cerebrospinal fluid is much more decisive, because there is no other disease of the nervous system which produces it. RIZZO believes it to be the rule and gives it an extraordinary significance in cerebral cysticercosis, but neither of Gotor's patients had eosinophilia in the blood or the cerebrospinal fluid; his first patient showed it in the cerebrospinal fluid only after surgical intervention [the nature of which is not specified].

When eosinophilia exists, the radiographic confirmation of the calcified cysts is of great value. The two radiograms of Gotor's second patient, obtained with the help of light narcosis, are illustrated, but the reproductions are not good. They showed numerous typical calcifications, which at first sight recalled the brain of his first patient when the dura was opened. In both patients the brain looked as if it had been peppered with small shot. The shadows seen in the second patient were like those described by SCHÜLLER, namely polyhedral shadows with an interrupted and hard contour and a homogeneous density, though they were smaller than Schüller's. Calcified brain tumours give shadows which are not homogeneous and have less precise contours. ALBRECHT and others describe cysticercus shadows as being rounded, clearly defined and about the size of peas. The calcifications may be better seen elsewhere than in the brain, *e.g.*, they have been more clearly seen in the leg and the pelvis. Calcifications may be absent throughout the patient's life. MACARTHUR thinks that calcification begins only three years after the death of the parasites, but this is no great obstacle to early diagnosis, because, according to MacArthur, the clinical condition only begins after the death of the parasites, when they swell and disseminate toxins. The parasites may introduce bacteria, which cause inflammatory changes and the sites they occupy may be more susceptible to circulating viruses; these viruses may kill the parasites themselves.

Discussing conflicting views about the value of complement fixation in these cases, Gotor claims that he excluded all errors due to chance and found that his first patient gave a positive blood reaction, the second a very strongly positive one. He concludes that taken together with the clinical peculiarities, the eosinophilia and the radiograms, complement fixation reactions are important aids to diagnosis. [See also this *Bulletin*, 1942, Vol. 39, pp. 468; 704–705.] *G. Lapage.*

ARCE (José). **Hydatidosis of the Lung.**—*Surgery, Gynecol. & Obstet.* 1942. July. Vol. 75. No. 1. pp. 67–73. With 18 figs.

TALLMAN (Eduardo). Quistes hidatidicos del riñon. [**Hydatid Cysts of the Kidneys.**]—*Med. Moderna.* Valparaiso. 1942. Feb. Vol. 15. No. 7. pp. 330–334. With 4 figs.

RIVAS (Carlos I.) & PERINETTI (Héctor). Quiste hidatídico de la glándula tiroides. [**Hydatid Cyst of the Thyroid.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1942. July. Vol. 18. No. 147. pp. 407–412. With 5 figs. [16 refs.]

DINNIK (J. A.) & ZVEREVA (N. S.). Un cas de parasitisme d'un cestode de genre *Raillietina* Fuhrman chez un enfant en Caucasie. [**Infestation with a Cestode (Raillietina) in a Child in the Caucasus.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 5. pp. 458–460. With 2 figs. [In Russian.]

WILKINS (E. Gordon). **A Simple Method of counting Hookworm Eggs in Faeces.**—*Indian Med. Gaz.* 1942. May. Vol. 77. No. 5. pp. 275–279. With 1 fig.

Working in a small up-country hospital in Ganjam, where special apparatus is not available, the author evolved a glycerin-salt technique for counting hookworm eggs which requires only simple apparatus. The results obtained with it have not been compared with those obtained by other standard methods, the merits of which the author recognizes, but he had no opportunity of using Lane's apparatus. He believes that great accuracy cannot be attained by any method, and claims that his method is accurate enough for clinical purposes. It is not intended for research workers.

A thick slide 75×25×1·7 mm. is cut into three equal pieces; the two end pieces are cemented (Durofix cement serves well) to the ends of another slide, leaving between them a space about 25 mm. square over which another slide about 30 mm. long may be laid to enclose a space of rather more than 1 cc. capacity. A 1 cc. pipette, graduated in hundredths, is cut into five short lengths, each containing 0·2 cc. A piece of galvanized iron wire which will fit the bore of this pipette is cut into pieces four inches long, one end of each being bent over to form a handle, the other end being filed off square.

The stool is stabbed with a piece of pipette till it is filled to the 0·1 cc. mark; it is pressed down and twisted till the faeces do not recede, excess of faeces being cut off with a stick passed across the end of the tube; the outside of the tube is cleaned. Its narrow bore prevents the entry of coarse matter and wire gauze screens with their uncertain results are avoided. The faeces are pushed out with the piece of wire on to one of the prepared slides and 0·9 cc. of a saturated solution of NaCl in glycerin is added slowly from a teated graduated pipette. The faeces are mixed with this solution with the wire, which has been washed clean in the last drops of the glycerin-salt solution. This direct transference of the measured volume of stool to the counting chamber minimizes loss of eggs. The faecal emulsion is then covered with the top slide and the preparation is put aside for 30 minutes to allow the eggs to float up to the under surface of the top slide. All the eggs in the area covered by the emulsion are counted (this should be done within two hours or the eggs will become crenated or translucent). The highest counts were obtained after leaving the preparation for one hour, but the counts obtained after 30 minutes to two hours were only slightly lower. The count is then multiplied by 10 to give the number of eggs in each cc. of stool. [*Cf.* GORDON, H. McL. and WHITLOCK, H. V., *Jl. Council for Sci. & Ind. Res.*, 1939, Vol. 12, pp. 50–52, who introduced a similar slide, easily made in the laboratory, which has two chambers. On the top slide over each chamber 1 sq. cm. is marked out; this square covers a volume of 0·15 cc. and the eggs in this are counted. There is thus no need to measure the volume of faecal emulsion put into each cell. A saturated salt solution is used. Statistical examination has shown the method to be reasonably accurate.]

The amount of stool examined is eight or ten times that examined by ordinary coverslip preparations of the same size. The eggs of other roundworms and of tapeworms are also seen. [An editorial note points out that a saturated solution of NaCl in water will not buoy up eggs of Taenia by floatation or D.C.F., although eggs of Hymenolepis are floated up by such a solution.] The glycerin-salt solution has a

specific gravity of 1·2964, which is higher than that of pure glycerin (1·2592) or of a saturated aqueous solution of NaCl (1·1960) or of a saturated solution of NaCl in any proportions of glycerin and water. [*Cf.* SAWITZ, this *Bulletin*, 1942, Vol. 39, p. 771, on the buoyancy of Nematode eggs in solutions of various specific gravities.] The concomitant floatation of débris did not cause any trouble. The glycerin-salt solution seemed to float up eggs better than solutions of magnesium sulphate or zinc sulphate. It is claimed that the tables given of three separate counts on each of 16 stools show that no single count varies so much from the average as to give a totally misleading clinical picture. The highest recorded count was 10,500, but very heavy infestations were not common in the area where the author worked.

Wilkins grades his cases, estimated by this method, into light infestations with counts in tens (10–90 eggs per cc.), moderate infestations with counts in hundreds (100–990 eggs per cc.), heavy infestations with counts in thousands (1,000–9,990 eggs per cc.), and very heavy infestations with counts of 10,000 eggs or more per cc. He uses a system of marks to estimate the effects of treatment, giving, for example, two marks for a reduction of the egg count from the very heavy to the heavy infestation group. The efficiency index obtained by this system agreed with his clinical estimate of the efficiency of the treatment. The treatment given was usually 2 cc. of carbon tetrachloride with 1 cc. of oil of chenopodium made up with 15 gm. of magnesium sulphate and water to 30 cc., given in the morning after a glucose drink. This was a full dose for an adult male or well-built woman (weighing 7–8 stones only in that area); smaller doses were given to others and to children. Latterly Wilkins has been giving 1 cc. of the above mixture per 4 lb. of body weight, which is almost exactly 1 drachm per stone of body weight. The author discusses the sources of variations in the egg count, which affect all methods of counting. He claims that his method helps the physician to decide the importance of the hookworms in the whole clinical picture. He thinks that persons with small counts can be left for later treatment, saying that low counts found in the routine examination of school-children do not call for treatment in the absence of anaemia or other indication. [HEILIG (see below) records evidence that in some cases the heart condition will not improve until the worms have been completely removed, even when iron treatment has overcome the anaemia.] Wilkins treated all moderate cases if the haemoglobin was less than 80 per cent. Sahli. Hookworm "sterilisation" was not possible because children came from scattered villages. *G. Lapage.*

HEILIG (Robert). **The Pathological Heart Conditions in Hookworm Disease and their Causes.**—*Indian Med. Gaz.* 1942. May. Vol. 77. No. 5. pp. 257–261. With 2 plates. [19 refs.]

The author examined 65 cases of severe, uncomplicated, afebrile hookworm disease, during anti-anaemic and anthelmintic treatment. The clinical picture of the heart condition is described in detail, the author believing this detail to be necessary, because the differential diagnosis from some valvular lesions is difficult. The differentiation between hookworm disease and decompensated mitral disease with failure of the right heart is especially important, because the treatment and the fate of the patient depend upon it. Palpation,

percussion and auscultation are often not enough. The deciding factors in heart failure due to mitral regurgitation, namely, dyspnoea, cyanosis usually with subicteric tinge, enlargement of the liver, congestion of the kidney with oliguria, albuminuria and urobilinuria, normal diastolic pressure and normal or increased erythrocyte counts and haemoglobin percentage, are all absent from the picture of ankylostomiasis, in which the blood shows microcytic, hypochromic anaemia, erythrocyte counts as low as 0·7 million and a haemoglobin percentage of 10 per cent. Sahli or less.

It is usually said that the damage done to the heart in ankylostomiasis is due to the anaemia; if this is true, the pathological heart signs should disappear when the blood is sufficiently improved. The author's observations showed that this usually happens. Patients were given a uniform anti-anaemic treatment of Blaud's pills. 90 grains a day; when the haemoglobin reached 30 per cent., they were given intramuscular injections of calcium gluconate (10 per cent., 10 cc.) every day with the iron as well, until the haemoglobin reached 40 per cent. Then they were given 30–45 minims of carbon tetrachloride with 10–15 minims of oil of chenopodium divided into two or three doses, and the hookworms passed during the following 12 hours were counted, or, if they were too numerous, they were roughly estimated. The patients were not declared free of worms until 4–6 motions, examined on alternate days, were free from eggs. At weekly intervals the erythrocyte count, haemoglobin percentage, blood pressure and electrocardiograms were taken.

In 90 per cent. of the 65 cases examined, gradual and very considerable improvement of the heart, strictly parallel with the increase of erythrocytes and haemoglobin, followed before the anthelmintics were given. The slapping, rapidly vanishing apex beat, displaced outwards and downwards to the sixth intercostal space in most cases, moved to its usual area and became normal; the systolic murmur in the pulmonary area became inaudible; the palpable closure of the pulmonary valve and the accentuation of the pulmonary second sound were no longer perceptible; epigastric pulsation disappeared. From many cases the oedema was absorbed. The author found that the best and most harmless diuretic for the elimination of ascites was ammonium chloride grains 15 with calcium chloride grains 10. Case histories are given and some of the electrocardiograms are well reproduced.

Apart from these cases, 6 patients remained, all of them being women, whose blood improved equally rapidly, but the heart size in these six patients did not diminish; the electrocardiograms did not improve, being sometimes worse with 50 per cent. haemoglobin than with 15 per cent. The physical signs were almost uninfluenced. But soon after anthelmintic treatment all the pathological heart signs disappeared from these women also: deworming, therefore, was necessary to improve the heart condition. In two of these women the first dose of the anthelmintic left about 100 worms behind and the electrocardiograms deteriorated further; repetition of the anthelmintic was necessary to improve them, although the haemoglobin had increased to 67 and 70 per cent. respectively. One of these two was given large doses of vitamin B_1 to test the view that there is deficiency of this vitamin in ankylostomiasis, but her electrocardiogram deteriorated still more after this treatment, while deworming resulted in improvement.

Heilig discusses the causes of the changes in the heart and claims that his observations show that degrees of hookworm infestation that cause severe anaemia are regularly accompanied by a serious, diffuse myocardial lesion which causes general dilatation of the heart. The murmurs produced are not "haemic" murmurs only, but are also, probably, consequences of functional, supravalvular pulmonary stenosis and a relative mitral insufficiency due to dilatation. In most cases this dilatation is probably due to anoxia resulting from severe deficiency of haemoglobin, because it disappeared from 90 per cent. of his patients without deworming when the anaemia was treated with iron. Because in the six women the heart condition improved only when deworming was complete, although the haemoglobin percentage had risen from 10–15 per cent. to 40–60 per cent. Sahli, the author thinks that two factors may be involved, namely anaemia and a toxic agent derived from the hookworms. Most cases can compensate, perhaps only temporarily, against the action of the toxic agent when the anaemia is corrected, but in a minority the toxic agent acts whatever the condition of the blood may be. Heilig could not decide whether this toxic agent is a toxin or an allergen: the eosinophilia often recorded suggests that it may be an allergen. In any event the best and most permanent results follow deworming after iron treatment and it is better to prolong the iron treatment after the deworming.

G. Lapàge.

NICKEL (Hannah S.). **Amebiasis and Hookworm Infection as found in Approximately 50,000 Fecal Examinations in Mississippi.**—*Amer. Jl. Trop. Med.* 1942. May. Vol. 22. No. 3. pp. 209–215. With 4 maps.

Faecal specimens from every section of the State of Mississippi were examined during a period of 33 months; only single specimens were examined in most of the cases. The zinc sulphate centrifugal floatation technique was used. The specimens were 24–72 hours old. One out of each 44 members of the population was examined, a total of 49,170. *Entamoeba histolytica* was found in 4·4 per cent., other protozoa in 30·1 per cent. [species not given], hookworm in 24·3 per cent. [species not given], and other helminths in 2·9 per cent. [species not given].

The low percentage of *Entamoeba histolytica*, of the incidence of which in Mississippi no other records are available, may be explained by the facts that only the cysts could be found by the technique used, that one specimen only was examined from most individuals, and that the age of the specimens may have allowed cysts to disintegrate. Maps show the incidence in the counties of Mississippi; most of them are reasonably near 4·4 per cent. Hinds county showed only 2·4 per cent., but, although this county has the largest population in the State, most of the specimens came from urban school-children and closely supervised persons handling food, groups in which the incidence is accepted as being low. About 90 per cent. of the specimens from Neshoba county were from Choctaw Indians and this county had a high incidence of 9·0 per cent. In the adjoining Newton County the specimens were almost entirely from youths of the National Youth Administration clientèle and showed an incidence of 11 per cent. Practically 100 per cent. of the populations of these two counties are rural with low incomes, while Hinds County is over 60 per cent. urban.

The estimated incidence of *E. histolytica* in the American population at large is 10 per cent. The probable incidence for Mississippi is 22 per cent., if account is taken of the estimate of SAWITZ, FAUST and THOMSON that the author's single technique for diagnosis of one stool specimen from each individual gives one chance in five of detecting *E. histolytica*.

The Rockefeller Sanitary Commission surveyed hookworm incidence in Mississippi State in 1910 and concentrated its efforts on those counties found to have an incidence of more than 15 per cent. For the 52 counties of that group their average percentage was 53·1 per cent.; they used the simple smear method. Vanderbilt University School of Medicine and the Mississippi State Board of Health again surveyed the State in 1932–33, using the Stoll egg count method, which was found better than the simple smear; they surveyed the same 52 counties and found a positive percentage of 19·6 out of 44,380 specimens. Nickel used only the zinc sulphate centrifugal floatation method and between July 1938 and April 1941 found 24·3 per cent. positive out of 49,170 specimens taken from every section of the State; in the 52 counties studied by the two other surveys she found 31·2 per cent. positive out of 36,248. Maps illustrate these three surveys. There was thus a remarkable decrease in the 52 selected counties from 53·1 to 19·6 per cent. in the 20 years between the first two surveys and an increase from 19·6 to 31·2 per cent. between the second and the third surveys. Nickel does not think her technique is better than that used by the other two surveys. No actual quantitative work was done, but day to day observation led to the belief that the number of heavily infested individuals has dropped considerably.

The author's conclusion is that, although the severity of hookworm infestations has apparently been reduced, the number of persons infested has increased. Continued control is therefore necessary to counteract the potential danger of further dissemination.

G. Lapage.

GALLIARD (Henri). Recherches sur le mécanisme de la transmission des filaires par les culicidés. [**Researches on the Mechanism of the Transmission of Filariae by Culicidae.**]—*Ann. Parasit. Humaine et Comparée.* 1941. Vol. 18. Nos. 4–5–6. pp. 209–214. With 6 figs. on 1 plate. [17 refs.]

The author studied the emergence of the larvae of *Wuchereria bancrofti* from *Culex fatigans* and of *Dirofilaria immitis* from *Aëdes aegypti* and *A. albopictus*, confirming the work of MOCHIZUKI and others, who found that these larvae emerged by the tip of the labellae rather than by the membrane of Dutton between the labellae. Good photographs illustrate this process. Some larvae may fail to penetrate the tip of one labella and may then turn round and return to the labium and emerge by the tip of the other labella. The larvae seem to require a stimulus to make them emerge and the chief stimulus under natural conditions seems to be the mechanical one of flexion of the proboscis at the moment of feeding. At a temperature of 30–35°C. the larvae do not stay in the insect longer than 9–10 days after they have reached their infective stage, being eliminated often just as quickly when the insects are fed on sugar water; but, if the temperature is lowered, they may persist in the insect indefinitely, the activity of the larvae being much less at lower temperatures.

The proboscis of *Aëdes aegypti* or *A. albopictus* may contain four or five larvae, but Galliard found as many as 13 larvae in the proboscis of *A. aegypti* and distension of the labium by several larvae may end in rupture of it. These relatively small insects, when they are thus infested, may fly heavily and maladroitly, so that they may damage the proboscis when feeding or by flying against the sides of glass vessels in which they are confirmed. But it seems well proven that the infestation does not harm the insects. *G. Lapage.*

RUTISHAUSER (Armin). Beitrag zur Operation der Skrotumelephantiasis. Erfahrungen aus dem Spital von Dr. Albert Schweitzer in Lambaréné, Gabon (Afrique Equatoriale Française). [**Contribution to the Operation for Scrotal Elephantiasis.**]—*Deut. Trop. Ztschr.* 1941. July 15. Vol. 45. No. 14. pp. 436–440. With 7 figs. [11 refs.]

The author describes two modifications of the operation for scrotal elephantiasis, which improve the results obtained. These are the separation of the scrotal suture as far as possible from the anus by the substitution of a single big posterior skin flap for the two lateral ones which have been employed and the complete separation of the suture round the base of the penis from the scrotal suture by drawing the penis through an elliptical slit cut into the skin below the symphysis pubis.

The author did a large number of operations in Gabon and was not satisfied with the methods he learnt there, which were similar to those of Thieme. The classical operations of Müller and Manson leave the penis without plastic skin covering, this being left to nature. Ali Bey's method of taking skin from the mons veneris to cover the penis is better. Thieme takes skin from the sides of the scrotum ; the tissue under this is often diseased, so that the skin over it is separated with the greatest difficulty and the blood supply is not satisfactory ; the result is that early necrosis is to be feared. The removal of all diseased skin is not possible in practice and the mutilation resulting from attempts to do it is not necessary. Skin for making a new scrotal sac must be freed from diseased subcutaneous tissue—a difficult task.

Nägelsbach came nearest to the requirement that the scrotal suture should be as far as possible from the anus. His suture had the form of a double cross, and he put a glass or rubber drain in one or other of the hinder ends of the suture ; this is relatively near the anus and can be a source of infection of the wound. Another disadvantage of his method is that the sutures meet at three places ; these are weak points from which the whole wound may break open.

Rutishauser first tried increasing the size of Nägelsbach's two posterior skin flaps and ended by making instead a transverse incision across the scrotum, or one with a slight upward convexity, from which another passed forwards to the incision at the base of the penis. This gave the greatest possible separation of the scrotal suture from the anus, but the suture at the base of the penis still met this transverse scrotal suture. To separate these (fig. 1) the penis was separated from its bed of diseased tissue by a superficial, circular incision round the pocket of hypertrophied tissue in which it lies and the skin of the shaft of the penis and that of the prepuce was separated from its diseased subcutaneous tissue. Below the penis, in the skin passing down from the symphysis pubis, an elliptical slit was made, the long axis of the

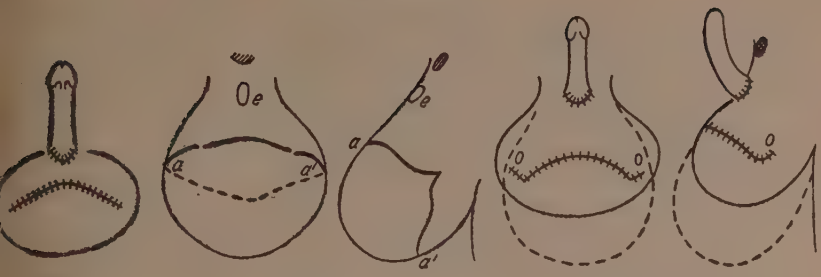

Fig. 1. Fig. 2. Fig. 3.

Reproduced from the *Deutsche Tropenmedizinische Zeitschrift.*

ellipse being in the longitidudinal axis of the body of the patient, the subcutaneous tissue being separated here also. Then the penis was drawn through this slit, together with its original skin. To prevent retraction of the body of the penis, its skin was fixed by catgut to the corpora cavernosa. There was thus a circular suture round the root of the penis quite separated from the transverse one in the scrotum.

Herniae, hydroceles and haematoceles, which may coexist with elephantiasis of the scrotum, are treated with it. Castration was rarely undertaken when large haematoceles were present. All the operations were done under local anaesthesia with the patient flat on the table and not in the lithotomy position.

Amputation of the scrotum was done by incising round it transversely after separation of the testes, gubernacula and spermatic cords, which were replaced in the scrotal wound after the amputation; the hinder border of the wound was then sutured to its upper border. Figs. 2 and 3 illustrate this operation. The cosmetic results of it were good. *G. Lapage.*

YOUNG (W. A.) & GORDON (S.). **Onchocerciasis in a West African Native on Service in East Africa.**—*East African Med. Jl.* 1942. July. Vol. 19. No. 4. pp. 131–134.

The authors record a case of onchocerciasis in a West African native serving with the Forces in East Africa. So far as was known he had not served in any part of East Africa in which onchocerciasis has been reported, but stated that he had previously lived all his life in the Northern Territory Province of the Gold Coast, in a region, as was pointed out by GIBBINS in a letter to the authors, in which *Simulium damnosum* has recently been found by MORRIS. This region is near Tamale on the river Volta. The authors are inclined to think, therefore, that the patient brought his disease from the Gold Coast, and that it apparently did not show itself for at least one year. The diagnosis was abundantly confirmed. *C. W.*

ENZER (J.). **A Preliminary Report on the Treatment of Onchocerciasis.**—*East African Med. Jl.* 1942. July. Vol. 19. No. 4. pp. 134–135.

The author has treated a number of cases in 200 families removed from an area of Kenya infested with Simulium to a region free from

that fly. Of the drugs tried, only euflavine (Gonacrin), tryparsamide and Bayer 205 appeared to be effective, and then only if combined with protein shock (T.A.B.) therapy. Euflavine was given in doses of 10 cc. [but the strength and route, presumably intravenous, are not stated], tryparsamide in 2 gm. doses, and Bayer 205 in 1 gm. doses [but the spacing and duration of the courses are not made clear, nor is it explained exactly how protein shock was related to the giving of these drugs].

Skin snips were taken twice after completion of treatment, the first after one month, the second three months later. Persons with negative results to both, and disappearance of itching, photophobia and lachrymation, were regarded as apparently cured. No satisfactory history has yet been obtained of recovery, or partial recovery, of sight.

The author admits this to be a somewhat premature note, written in the hope that others will repeat the work. *C. W.*

VARGAS (Luis). Algunas consideraciones sobre el desarrollo de *Onchocerca volvulus* en los Simulidos. [**Some Considerations on the Development of** *Onchocerca volvulus* **in Simuliidae.**]—*Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1942. Mar. Vol. 3. No. 1. pp. 57–65. With 14 figs. on 3 plates. English summary.

The salivary glands of Simulium occupy a twelfth part of the total volume of the thorax. The mouth parts occupy the volume of a cylinder 0·31 mm. high and 0·04 mm. in diameter. The maximum number of microfilariae which can be sucked up mechanically never reaches 10; but other factors come into play, namely, haemorrhage, laceration of the tissues with consequent liberation of microfilariae, aspiration of tissue fluids and cells by the negative pharyngeal pressure and the marked chemotactic attraction of the microfilariae to the saliva of the insect. By the combination of all these factors Simuliidae can ingest more than 100 microfilariae each time they suck blood.

The author quotes HOFFMANN's earlier statements on Onchocerca in Mexico, that in *Simulium callidum* and *S. ochraceum* the microfilariae pass very quickly through the walls of the stomach to develop between the thoracic muscles into the sausage form; that he (Hoffmann) never saw microfilariae in the stomach 24 hours after feeding; that the microfilariae reached the sausage form in *Eusimulium mooseri* (= *callidum*), because he found the typical form, resembling the numeral 1, 68 hours after the entry of the microfilariae into the black-fly; and that he distinguishes four phases in the insect. These phases are: (1) The entry of the microfilariae into the stomach and then into the thoracic muscles, where they can be found after 20 hours. They do not then differ in form or size from microfilariae which can be found in the skin. There is not yet any space round them. Those which cannot leave the stomach die and are digested. They have some difficulty in passing through the stomach walls. (2) A phase of shortening; (3) The so-called sausage forms; (4) The worm- or maggot-like phase.

Vargas thinks that Hoffmann's description of the events of the first phase is too schematic. The anatomy of the digestive tube should be taken into consideration. After a description of this, he concludes that microfilariae found in the thoracic muscles did not come from the midgut, because they could not pass through its walls. Those left in the stomach are, as Hoffmann, stated, probably digested. All the

microfilariae that reach the thoracic muscles most probably come from the eosophageal diverticulum, the walls of which are very thin. It can even be supposed that this diverticulum may be so much distended that it bursts and sets microfilariae free.

In an earlier paper Vargas showed that the microfilariae develop especially in the dorso-ventral muscles. He describes his method of clearing whole black-flies and examining them from both sides on the same slide by turning the slide over. This method does not reveal all the microfilariae in the fly, but only those in the thoracic muscles, where they develop most often ; but the method provides a basis for comparison of the degree of infestation of different species of black-flies. Examination in this way of about 75 specimens of *S. callidum* caught in September in the region of Chiapas, from which Hoffmann also obtained material, showed that 100 per cent. of the flies were infested.

Pieces of skin removed from infested patients were put in Petri dishes and moistened with human serum mixed with Locke's solution or with Locke's solution alone, the dishes being kept at laboratory temperature (22°–25°C.) in a moist chamber. The abundant and very active microfilariae found in the pieces of skin at first showed no internal structure, but after 24 hours they showed granules regularly arranged from head to tail and they were still active ; the anal excretory pore was by that time visible. After 48 hours their movements were slower, but none had died. After 72 hours 60 per cent. were dead and after 96 hours all were dead. In *Eusimulium mooseri* (=*callidum*) Vargas observed the sausage form 68 hours after its infective feed. Measurements of microfilariae taken from the skin of patients by biopsy indicated an average length of 270 microns, which, like the facts just stated, shows that a stage of shortening does not occur. Vargas thinks that we still need a detailed study of the complete cycle of developmental stages in the black-fly. *G. Lapage.*

CULBERTSON (James T.). **Active Immunity in Mice against** *Trichinella spiralis.*—*Jl. Parasitology.* 1942. June. Vol. 28. No. 3. pp. 197–202.

Various earlier workers have shown that immunity against *Trichinella spiralis* is acquired after recovery from a previous infestation and most workers agree that this immunity is directed against the intestinal phase of the parasite. Its mechanism is still obscure.

Culbertson studied acquired immunity in the albino mouse, which has been little used for such work. Larvae were obtained from infested rats by artificial digestion of their eviscerated and ground-up carcases. The larvae were suspended in bacteriological broth to which 20 per cent. of gelatin had been added and in this they survived for several days ; it was also easier to administer them in this, because they stayed in suspension in it for some minutes. They were given to the mice by injection through a blunted 22-gauge hypodermic needle pushed into the retropharynx and were usually swallowed without difficulty. The mice were killed 4–7 days after the larvae had been given and their intestines were repeatedly examined for adult Trichinellae. Other mice were given one or more preliminary doses of larvae and, after an interval, a test dose, which was also given to controls. At autopsy 5–7 days later, or in some instances 27–35 days

later, the number of larvae recovered from the muscles was counted. Two groups of 5 and 6 mice were given larvae to determine whether prior infestation prevented subsequently administered larvae from developing to the adult stage. Group A of five mice received 100 larvae 22 days before a test dose of 175 larvae; group B of 6 mice received 100 larvae 60 days before a test dose of 250 larvae. Group A, with its 7 controls given the test dose only, were killed 5 days after the test dose; group B with its five controls were killed seven days after the test dose. From none of the previously infested mice were so many adult worms recovered from the intestines. The number of adults recovered from group A represented an average of 8·6 per cent. of the larvae fed, while the number recovered from the controls of this group represented an average of 55·5 per cent. of the larvae fed; for Group B the corresponding figures were 1·4 and 50·8 per cent. respectively.

Seventeen mice were given four doses of 250 larvae at each dose 60, 36, 22 and 10 days before a test dose of 1,000 larvae; and nine controls were given the test dose only. When they were all killed 27–35 days later the muscles of the controls contained an average of 154,626 larvae, while those of the previously infested mice contained an average of 60,087 larvae; it is to be noted that the controls received only about half as many larvae and suffered about two and a half times as much. By the third day after the test dose many of the previously infested mice showed an exudate from the anus and when this persisted for several days they died; seventeen died from the 9th to the 23rd day after the test dose, although all the controls survived and none showed the anal exudate; but when they were autopsied during the fourth week after the test dose the controls were rapidly losing weight, some were moribund and it was unlikely that they would have survived. The survivors of the previously infested ones, on the other hand, put on weight and seemed not to suffer at all.

McCoy showed that rats can be protected by "vaccination" with antigens, although the attempts of Bachman and Rodriguez-Molina to protect hogs in this way have failed. Culbertson vaccinated mice by injecting 0·1 cc. of a 1 per cent. suspension of *Trichinella spiralis* powder in carbolized salt solution per 10 gm. mouse weight, giving eight injections on alternate days. Five days after the last injection 11 mice and 10 controls were given 250 larvae and all were examined four days later and their intestines searched. In the vaccinated mice only about half as many adult worms were found, representing 28·4 per cent. of the larvae fed, while the controls had adults representing 52·8 per cent. of the larvae fed. Two of the vaccinated mice evidently failed to respond, but the others had a significant immunity. Doses of 250 larvae were given to nine vaccinated mice and seven controls on the fifth day after the last injection of Trichinella substance. At autopsy 28–29 days later 20,248 larvae were recovered from the muscles of the vaccinated mice and 55,139 from those of the controls. Two of the vaccinated mice yielded almost as many as the controls did.

Culbertson concludes that both previous infestation and vaccination confer immunity which is effective against the intestinal phase. He and Kaplan in 1938 had reported that rabbit antiserum rich in the specific antibody gave mice a partial immunity. Prior infestation gives a higher immunity than either vaccination or passive immunization. The death of some of the mice immunized by prior infestation is explained as being due to hypersensitivity to the Trichinella substance.

BERCOVITZ, in a personal communication to the author, said that similar acute early symptoms suggesting hypersensitivity may occur in human beings when they are reinfested. *G. Lapage.*

CULBERTSON (James T.). **Passive Transfer of Immunity to *Trichinella spiralis* in the Rat.**—*Jl. Parasitology.* 1942. June. Vol. 28. No. 3. pp. 203–206.

For this work similar methods were used for the recovery of worms and larvae. Four adult normal rats which had been given by the mouth 2,000 isolated larvae were bled one month after the larvae were given and the sera were pooled for use. Normal serum was obtained from several normal rats. Five-tenths of a cc. of these sera were given intraperitoneally two days before and on the day after infestation with 250 larvae of Trichinella, this dose of serum being the equivalent of 3 cc. per 100 gm. of rat weight.

The number of worms recovered from the intestines represented in the rats receiving immune serum 4·5 per cent. of the larvae given, in the rats receiving normal serum 24·0 per cent., and in the rats receiving no serum 24·7 per cent. The average number of larvae recovered from the muscles of the rats given immune serum was 12,089, the average number recovered from the rats given normal serum was 47,613, and the average number from the rats receiving no serum was 56,564. These results indicate that a passive immunity can be transmitted. By it the development of the worm in the intestine is checked as it is by active immunity, but the check is not so effective; but the comparatively small amount of immune serum used could hardly be expected to equal the effect of the total blood of an actively immunized animal; there is no reason to suspect a qualitative difference. The immunity is evidently conferred by some humoral substance in the blood and Culbertson thinks that the same substance acts in active immunity. The rapidity of the response has precedents in the Arthus reaction in the skin of rabbits, which occurs 2–3 hours after injection of the specific antigen, even if the animal has been passively sensitized; in anaphylactic shock, which may occur a few minutes after the homologous antigen is injected into a well sensitized guineapig, whether it is actively or passively sensitized; and in allergic reactions in the skin of man, which reach their peak within a few minutes after the tissue has had contact with the specific antigen. The rapidity of the reaction is thus no argument against the suggestion that a humoral substance in the blood is concerned and conventional mechanisms cannot be excluded. *G. Lapage.*

DEFICIENCY DISEASES.

FERRO-LUZZI (Giovanni). Primi studi su una particolare forma di pseudo-tabe tropicale. [**A Peculiar Form of Tropical Pseudo-tabes.**]—*Boll. d. Soc. Italiana di Med. e Igiene Trop.* (Sez. Eritrea.) Asmara. 1942. Vol. 1. No. 2. pp. 5–14. English summary.

Professor Ferro-Luzzi describes, from the clinical point of view only, a peculiar condition which he denominates a "polyneuritis of a pseudo-tabetic type." He places it among the group of diseases caused by deficiency of vitamin B_1, although the diet of the patients has not

been deficient in this vitamin, nor is the disease improved by giving the vitamin. It may be due to defective vitamin B_1 metabolism rather than to lack. Of 32 cases of polyneuritis of various types seen by him in three years, 13 have been of this form; the condition is, therefore, not rare. It attacks young male European adults.

The first symptoms noticed by the patient are paraesthesias and weakness of the legs, neuralgia, difficulty in walking due to incoordination of movements. At first these are slight and transient; later are more marked. Groups of muscles atrophy and the "steppage gait" develops and walking becomes impossible. Occasionally the legs and, less often, the trunk and face beome oedematous. Praecordial pain and dyspnoea are common; the cardiac area is enlarged and the heart-sounds embryonic; there is moderate cyanosis. The liver is enlarged, probably owing to stasis. Romberg's sign is always present, but the Argyll-Robertson pupil is not observed. The Wassermann reaction is negative both with the serum and with the spinal fluid. Knee-jerks are lost. Tactile, heat and pain senses are dulled in the affected limbs. Certain muscle groups show the reaction of degeneration. If the cardiac changes progress, death may result; in any case, the course is very prolonged, perhaps for years, and recovery is never complete. By way of treatment the author gives vitamin B and employs strychnine, electricity, diathermy and massage.

The condition is distinguished from beriberi by the facts above stated —that the diet is not deficient in vitamins and that the giving of this vitamin does not benefit [but he mentions it as part of the treatment]; from locomotor ataxy by the absence of ocular symptoms, the negative Wassermann reaction and the cardiac symptoms; from spinal growth by the course of the disease and the presence of cardiac symptoms. [The condition will probably remain obscure till an opportunity occurs for a complete post mortem examination. One of the author's patients died, but not in hospital and autopsy was not performed].

H. Harold Scott.

SCARBOROUGH (Harold). **Circumcorneal Injection as a Sign of Riboflavin Deficiency in Man with an Account of Three Cases of Ariboflavinosis.**—*Brit. Med. Jl.* 1942. Nov. 21. pp. 601–604. With 1 chart. [10 refs.]

Circumcorneal injection has been described as one of the ocular abnormalities which may be present in riboflavin deficiency in man. In an effort to evaluate the specificity of this sign, its incidence was noted in a series of 204 out-patients free from ocular infections. Circumcorneal injection was found in 70 of these patients, 43 instances occurring in the group of 63 persons over 50 years of age.

Because it seemed unlikely that such a large proportion of patients suffered from riboflavin deficiency, therapeutic tests were carried out on small selected groups:—eight persons with circumcorneal injection but no other signs suggesting avitaminosis showed no improvement after oral and/or intramuscular administration of 3 to 12 milligrammes of riboflavin daily over periods of 14 to 27 days. A second group of eight patients with clinical evidences of vitamin deficiencies was composed of six patients with scurvy, one with pellagra and one with hypochromic and microcytic anaemia. All these had circumcorneal injection and had been treated with ascorbic acid, the patient with anaemia took ferrous sulphate and the one with pellagra was treated

with nicotinic acid. Riboflavin was administered by mouth in doses of 6 to 12 milligrammes for 14 to 28 days or by intramuscular injection of 5 or 10 milligrammes daily for 2 to 10 days. Three patients with scurvy showed no improvement of circumcorneal congestion, two were improved and one cured. The ocular signs of the patients with anaemia and pellagra were cured. Three instances of typical aribo-flavinosis were observed during the same period, these responded to adequate therapy with riboflavin. It was notable that relapse occurred when riboflavin was withdrawn from those patients who had secured improvement under treatment. [It is obvious that circumcorneal injection may be caused by many conditions other than riboflavin deficiency and that solitary pathognomonic signs of avitaminosis probably do not exist.] *V. P. Sydenstricker.*

Díaz Rubio (M.). Estudios sobre la enfermedad de Casal. I. Comunicación.—El comportamiento de la secreción gástrica en la pelagra y consideraciones sobre el mismo. [**Studies in Pellagra. I. The Gastric Secretion.**]—*Rev. Clín. Española.* 1941. Apr. 1. Vol. 2. No. 4. pp. 323–334. [57 refs.] French summary.

The author has made a detailed investigation of the gastric secretion of 342 pellagrins. First, as regards the amount secreted by the fasting stomach; this was practically normal in 178 (52 per cent.), in 116 (33·9 per cent.) it was reduced, in 48 (14 per cent.) it was increased (above 40 cc.), but in one only was there marked increase to over 100 cc.

Next, the total acidity; in 3·5 per cent. only was it normal, diminished in 95·6 per cent. Free HCl, in the fasting state, after stimulation by alcohol or by histamine, was present in normal amount in 3 patients (0·9 per cent.), diminished in 10 (2·9), in one increased, in the vast majority, 328 or 96 per cent., absent. The method used in 265 was Ehrmann's alcoholic solution, in 52 injection of 0·5 mgm. histamine, in 25 both these methods. Extraction of the gastric contents was carried out at intervals of 30, 45 and 60 minutes, and in some cases at 15 and 80 minutes also.

The author discusses these changes and the part they play in pellagra whether there is parallelism or any demonstrable relation between the secretory changes and other symptoms of the disease, and concludes that achylia is a characteristic and very constant symptom, that there is parallelism between the gastric changes and the clinical condition, and that the administration of nicotinic acid relieves the achylia. [The contribution is embellished by many quotations and references to well-known names in the literature of pellagra.]

H. Harold Scott.

Díaz Rubio (M.) & Lara Roldán (L.). Estudios sobre la enfermedad de Casal. II. Comunicación: El comportamiento radiológico del estómago en la pelagra. [**Studies in Pellagra. II. Radiological Examination of the Stomach.**]—*Rev. Clín. Española.* 1942. Mar. 30. Vol. 4. No. 6. pp. 408–413. French summary.

During the period 1937–39 the authors studied this aspect of the question in 255 pellagrins in Madrid. They noted the tone of the

stomach walls, the peristaltic movements, whether normal, diminished or increased, and the appearance of the mucosa. The tone was lowered in 170 cases (67·2 per cent.), dilatation was seen and in 161 (63·1 per cent.) peristalsis was diminished and evacuation delayed, in some to high degree. Marked aerogastria was observed in certain of the patients and the mucosa was covered with thick, viscid secretion. In 59 patients examination was repeated at different times or in different clinical stages and the close inter-dependence or correlation between the clinical state and the gastric changes was noted. [The value of these statements is discounted somewhat by the fact that in 71 (27·7 per cent.) the tone was normal, in 80 (31·6 per cent.) peristalsis was normal, and in 79 (30·9 per cent.) nothing abnormal was observed in the mucosa.] *H. Harold Scott.*

Díaz Rubio (M.). Estudios sobre la enfermedad de Casal. III. Comunicación: Constitución y pelagra. [**Studies in Pellagra. III. Pellagra and the Bodily Constitution.**]—*Rev. Clín. Española.* 1942. Apr. 30. Vol. 5. No. 2. pp. 101–105. [14 refs.] French summary.

Although this contribution is said to be based upon 578 pellagrins under the author's observation in the years 1937–39, the paper as a whole is very vague; no figures are mentioned and general statements are made as to the obscure effects of endocrines in pellagra. The fact that the disease occurs in certain families, or more in one family than another, forces the author "to admit the existence of a predisposition or resistance to pellagra." Other points which he refers to, but does not discuss, are the importance of age, of pregnancy, of the climacteric, instances of spontaneous cure, or, in others, of a course ending fatally in a short time. These last are ascribed to the subjects being "asthenic and hypoplasic," this condition itself being the result of thyroid, pituitary, adrenal or other endocrine disturbance.

H. Harold Scott.

Khorana (M. L.), Sarma (M. L.) & Giri (K. V.). **Investigations on the Food Value of Fish and Other Marine Products. Part I. The Antipellagra Vitamin (Nicotinic Acid).**—*Indian Jl. Med. Res.* 1942. Apr. Vol. 30. No. 2. pp. 315–318.

No systematic inquiry had previously been made into the food value of fish from the Waltair coastal waters. Accordingly, the nicotinic acid contents of the fresh muscle tissue of seer, shark, Jew fish, horse mackerel, ribbon fish, cat fish, "goldvindalu," "barai-matta," hilsa, pomfrets, silver bellies, whitebait, mullets, sabre fish, pollona, sardines, "sudumullu," prawns, crabs and cuttle fish, and of the fresh liver of seer and shark were determined by a chemical method. The content of the majority of these ranged from 2-4 mgm. in 100 gm. of muscle, a figure which compares favourably with that of the much more expensive mammalian muscle tissue. Hilsa and prawns were the two richest sources, containing 4·7 and 4·8 mgm. respectively. *H. N. Green.*

VENOMS AND ANTIVENENES.

STANLEY-JONES (D.) & HARRIS (Charles E. S.). **A Case of Adder Bite.** —*Brit. Med. Jl.* 1942. Oct. 3. p. 395.

A woman of 63 was bitten on the hand, in England, by a snake which was not identified; about 20 minutes later, the wrist having already been tightly bound, the punctures were incised and a few ounces of blood were allowed to escape. The binding at the wrist was then removed. Within a few hours there was marked toxic cellulitis of the whole arm, with oedema which later spread to the scapular region and the scalp; the path of the lymphatics was marked by wide areas of capillary haemorrhage. Treatment was palliative, in the absence of antivenene, and recovery was slow but was almost complete in 4 weeks. Constitutional reaction was slight throughout.

It is pointed out that the result of bite by a member of the family Viperidae may be interstitial fibrosis of the areas affected by the haemorrhage, and that if this occurs in the liver, spleen, kidneys or heart the outcome may be chronic invalidism. *C. W.*

ASSRATIAN (S. N.). **Pharmacological Properties of the Venom of** *Vipera ursini renardi.*—*Travaux Acad. Milit. Méd. Armée Rouge U.R.S.S.* Moscow. 1941. Vol. 25. [In Russian pp. 404–415. With 8 figs. (17 refs.) English summary pp. 415–416.]

PERGOLA (Alfredo). Affezioni oculari da veleno di "Naja nigricollis." (Osservazioni cliniche.) [**Eye Lesions due to the Venom of** *Naja nigricollis.*]—*Boll. d. Soc. Italiana di Med. e Igiene Trop.* (Sez. Eritrea.) Asmara. 1942. Vol. 1. No. 1. pp. 80–91. English summary.

There are several species of "spitting snakes" in Africa, but only one met with in Somaliland and Eritrea, *N. nigricollis*, whose bite may be fatal. This snake when disturbed aims its venom at the face of the intruder. Three cases under the author's observation are described. The history is similar in all. The patient saw a snake, about a yard in length, pass in front of him and almost immediately felt an intense burning pain in the eyes, which for a time blinded him. When coming under observation, it might be some hours later, there was still marked blepharospasm with a little oedema of the lids; on relief of the spasm the conjunctiva showed marked congestion and in parts inflammation as if acid or quicklime had been squirted in the eye, but further examination did not reveal any actual damage, though others have recorded subsequent ulceration of the cornea.

Antivenene can be given, but as a rule the condition is too acute for anything but local treatment—washing out with 1 : 5,000 potassium permanganate, instilling neutral atropine sulphate drops. Later 5 per cent. argyrol is of service. Cure is usually complete in 5–8 days. There was no sequela in any of the author's cases.

H. Harold Scott.

IYENGER (N. K.), DUTT (N. K.) & MUKERJI (B.). *In vivo* **Action of Some Substances on the Proteolytic System in Blood.**—*Indian Med. Gaz.* 1942. July. Vol. 77. No. 7. pp. 409–412. [11 refs.]

"The action of cobra venom on the tryptic activity of plasma has been studied. It has been found that up to a dose of 0·12 mg./kilo,

there is a remarkable increase in the trypsin content of plasma and it begins to go down if the dose is increased beyond this limit. The various possibilities regarding this increase have been investigated and it is suggested that the venom may be releasing into the blood stream trypsin from the tissues. It is interesting to recall that Iyengar *et al.* (1942) have reported that plasma trypsin is reduced considerably in cases of malignant growth and that Chopra and Chowhan (1935) have recommended the administration of cobra venom solutions in the therapy of cancer. The finding in the present investigation that the plasma trypsin is increased by the administration of the cobra venom may therefore be useful partially to explain the rationale of the treatment of cancer by cobra venom. The decrease in plasma trypsin brought about by larger doses of the venom is explained as due to the trypsin inhibitor reported to be present in the venom. This inhibitor effectively comes into action only when the venom is administered in larger doses not encountered in clinical practice. 2-methyl-1 : 4 naphthaquinone does not exert any action on the plasma trypsin, but appears to inhibit the catheptic activity of serum. It is suggested that this action of the drug may serve to explain the mechanism of the action of vitamin K in synthesizing prothrombin."

DE MAGALHÃES (Octavio). Escorpionismo. [**Scorpion Sting.**]—*Brasil-Medico.* 1942. May 16. Vol. 56. No. 20. pp. 252–253.

Recalling the experiment in which three camondongos [Brazilian house rat] were stung, one after the other, by the same scorpion, with the result that the first died, the second was severely affected and the third only slightly affected, the author recounts the case of a girl who was stung on the arm. The same scorpion also stung two attendants who treated the girl. The first patient showed the typical picture of scorpion sting, with sweating, chills, vomiting, cardiac arrhythmia and dyspnoea, from which she recovered after receiving serum. The second patient suffered severe local pain, which was relieved by novocaine, and the third experienced nothing beyond slight local pain and slight cramp.

Evidently the sting of a scorpion which has recently attacked an animal is not so severe as that of the first attack, and this may be the explanation of the mildness of the symptoms sometimes recorded.

C. W.

MOHAMMED (Ahmed Hassan). **Preparation of Antiscorpion Serum. Use of Atropine and Ergotoxine.**—*Lancet.* 1942. Sept. 26. pp. 364–365.

The author has previously shown that scorpion toxin directly stimulates the nerve endings of the autonomic nervous system without selection—it is a vaso-constrictor to either innervated blood vessels or to those whose sympathetic nerve supply has been cut. He has shown, moreover, that if the sympathetic and para-sympathetic nervous systems are first paralysed with atropine and ergotoxine (neither alone is effective), or with ergotamine tartrate, lethal doses of scorpion toxin can be injected without harm. This procedure, however, does not interfere with the development of immunity, and by the use of these drugs scorpion toxin (instead of formol toxoid) may be used from the outset for the preparation of immune serum. He quotes

experiments in dogs, rabbits and goats, to show that efficient sera may be prepared in this way; after the first 12 injections or so it was not necessary to continue the use of the drugs. Doses of the drugs and of the amounts of toxin used are given in detail. *C. W.*

GAJARDO-TOBAR (Roberto). El latrodectismo o envenenamiento producido por la picadura de la Araña del Trigo (*Latrodectus mactans*). [**Latrodectism: Poisoning by the Bite of the Wheat-field Spider,** *Latrodectus mactans.*]—*Prensa Méd.* Valparaiso. 1941. July–Aug.–Sept. Vol. 6. No. 28. pp. 3–18; 24. English summary. With 5 figs. & 5 charts. [35 refs.]

This is an excellent and detailed account of the Black Widow spider, its poison and toxic effects, and of some experimental work carried out by the author. The genus Latrodectus has several synonyms: malmignata in Spain and Italy, karakurt in Russia, menavodi in Madagascar, kalipo in New Zealand, mico in Bolivia, lucacha in Peru. The spider and its poison apparatus are described. The quantity of poison varies with age and length of time since previous discharge, but a full gland contains about 0·5 mgm.; it is clear and limpid when fresh, sticky and yellow when dried. It is said to be alkaline when warm, acid when cold and is more potent when alkaline [hence changes of climate and temperature may modify its toxicity]. The spider seems never to attack man unless it is irritated, handled or injured.

This species (*mactans*) is found from California to Patagonia and throughout Chile; it abounds in summer and particularly in dry seasons, hiding under stones, clods of earth and in crevices in the soil.

The author's description of symptoms is based on 23 cases seen between November and March, the sequence in successive months being 1, 2, 12, 3 and 5. Locally, there is usually little to be seen, merely a small red spot with the marks of penetration of the chelicerae. The symptoms will naturally vary according to the amount of poison injected and the susceptibility of the patient, but the usual course is as follows: A sharp prick is felt and the spider is usually found hiding in the clothes; then there is a brief period during which nothing is observed except some tremor and anxiety. In ten minutes or so pain returns and steadily increases, is of a burning character and spreads over most of the body. The muscles show clonic and tonic contractions and there are tremors and convulsive movements. These pass away and return again at intervals. Legs, arms, abdominal and thoracic muscles are involved, with rigidity, and the patient feels "as if death were imminent." Sweating, lachrymation and salivation are marked; the skin is acutely sensitive, the reflexes exaggerated, respirations rapid and shallow, heart-beat quickened, but later there is bradycardia. Arterial pressure is "incredibly high," 350 mm. in a man of 60, and 242 in a lad of 19 years, later returning to normal; there is albuminuria and, at times, priapism, enuresis and emissions. The symptoms abate after a few hours but with intermittent exacerbations, less and less severe till convalescence. During the acute stage the patient cannot walk; there is vomiting in more than half the cases, temperature is variable, it may be raised, remain normal or become subnormal; headache is common, with vertigo. An average case ends in recovery in a week or ten days. None of the author's patients died, but fatalities have been recorded. Treatment is symptomatic.

Theoretically, serum should do good, but as a rule the symptoms come on too rapidly and the small amount of toxin obtainable makes the preparation of antivenene difficult.

By his experimental work the author has shown that birds, reptiles and batrachia are much more resistant than are mammals. In susceptible animals the symptoms produced are the same as, or analogous with, those in man, but death results, in guineapigs, for example, in 5–12 hours. (The author has noticed in the fields of Casablanca, at the end of spring and during the summer, that there is a heavy mortality among calves, with symptoms like those seen in experimental work with sheep and other animals, and he believes that bites by Latrodectus are the cause.) Autopsy on experimental animals reveals nothing very distinctive. The notable findings are : pulmonary oedema, abundant bronchial secretion, at times bloodstained, pleural ecchymoses, congestion of liver, spleen and kidneys and perhaps infarcts in the last, peritoneal exudation and meningeal congestion. Animals which recover retain some degree of immunity for three months. [For a detailed and graphic account of the symptoms in man see also this *Bulletin*, 1936, Vol. 33, p. 401.] *H. Harold Scott.*

MISCELLANEOUS.

SONNENSCHEIN (Curt). Gesundheitsdienst in Südwestafrika in Nachkriegszeiten. [**Health Services in South-West Africa since 1918.**]—*Deut. Trop. Ztschr.* 1941. Apr. 15. Vol. 45. No. 8. pp. 225–235. With 6 figs.

The author gives a brief list of hospitals existing in South-West Africa, and follows this with remarks on the common diseases of the country. Typhoid fever is apparently less frequent than formerly, and bacillary dysentery is said to be sporadic, but amoebic dysentery is endemic, especially in the north. Tuberculosis is important, and has increased markedly in the natives during famine years, especially in mine workers and town dwellers ; the type is, in general, more acute than in Europe. The commonest cause of death among labourers is influenza.

Cerebrospinal meningitis is prevalent among mine workers, who are brought together in compounds and who therefore live in close contact. Diphtheria is rare, but scarlet fever is reported to be fairly common in European children. Brucellosis is well known, and is noted especially in the country of the Ovambo.

Of the venereal diseases syphilis is the most important, again especially in Ambo districts ; gonorrhoea is not uncommon. Yaws is rare in the farm country, but is frequently seen in Amboland. Leprosy is commoner in the north and in western Caprivi than elsewhere. Anthrax is especially seen in Ovamboland and Amboland. Typhus has been reported from Keetmanshoop and Windhuik. Smallpox occurs sporadically, but there was an epidemic in Caprivi in 1928. Plague was introduced into South-West Africa after the war of 1914–18 ; in 1932 there was a severe outbreak in Amboland.

Malaria is important, and benign tertian is the common form, though subtertian occurs in places. Malaria becomes epidemic towards the

end of the rainy season ; it is more intense in the north [no information as to the vectors is given]. Of helminthic diseases ankylostomiasis is the most important. Scurvy has been seen in mine workers and in Ovamboland in years of drought ; pellagra has been found near the border of Angola. *C. W.*

MELENEY (Henry E.). **The Problem of Certain Tropical Diseases in the War.**—*New England Jl. of Med.* 1942. July 30. Vol. 227. No. 5. pp. 159–162.

BLACKLOCK (D. B.). **An Epitome of the Prevention of Certain Diseases and Infections occurring in Man.**—*Jl. Roy. Nav. Med. Serv.* 1942. July. Vol. 28. No. 3. pp. 262–284.

BLANC (Georges) & BALTAZARD (Marcel). Transmission de l'infection à bacille de Whitmore par insectes piquers. I. Maladie expérimentale du cobaye. [**Transmission of the Bacillus of Whitmore by Biting Insects.**]—*Ann. Inst. Pasteur.* 1942. Apr.–May–June. Vol. 68. No. 4–5–6. pp. 281–293. With 8 figs.

From a patient suffering from melioidosis contracted in Indo-China the bacillus of Whitmore was isolated ; the infection was found to be readily transmissible to rodents by the rat flea and also by the mosquito *Aëdes aegypti* [see also this *Bulletin*, 1942, Vol. 39, p. 576].

Several hundred fleas infected by biting an infected guineapig were placed in a Borrel tube capped with fine silk gauze ; the tube was applied twice daily to the epilated ventral skin of guineapigs till the inguinal glands of the animals became enlarged to the size of a grain of wheat. Usually this happened after three to four days. In other cases the guineapigs were put into screened cages containing some thousands of infected fleas.

Twenty-one guineapigs were infected by rat fleas and two by *Aëdes aegypti*. All the animals died of melioidosis, usually in four to twelve days ; in one case death was delayed till 28 days after infection.

Blood cultures taken at the onset of the fever were negative, but fleas which were fed on the animals at this period became infected. After death the blood and spleen gave positive cultures except in the case of the guineapig which survived for 28 days.

The naked-eye and microscopical changes found after death are described. The glands associated with the region of the infecting bites were greatly enlarged and purulent ; the spleen was enlarged and often was riddled with miliary abscesses ; the liver was enlarged and fatty. In more than half of the cases there were abscesses in the lungs ; these usually resembled the nodules found in plague-infected animals.

John W. D. Megaw.

SPENCER (Gerald A.). **Ainhum associated with Hyperkeratosis Palmaris et Plantaris.**—*Arch. Dermat. & Syph.* 1942. Mar. Vol. 45. No. 3. pp. 574–577. With 2 figs.

The patient was a negro in New York, who had had hyperkeratosis of the palms and soles for many years. Bands around the small toes had appeared during the preceding 10 years, and the condition of ainhum, with rarefaction of bone, had developed slowly. The Wassermann reaction was positive ; there was no fungus infection locally. It is probable that the ainhum was a sequel to the underlying skin condition. *C. W.*

GILMAN (Robert L.). **A Review of Fish Poisoning in the Puerto Rico–Virgin Islands Area. A Report of Ten Cases occurring on Culebra Island.**—*U. S. Nav. Med. Bull.* 1942. Jan. Vol. 40. No. 1. pp. 19–27. With 2 plates.

In May 1941, the author examined six out of ten persons who became ill after eating a male Barracuda (*Sphyraenidae barracuda*) caught the day before. None of those who ate the fish escaped. Three cats and a dog later had some of it; all the animals fell ill and all the cats died. The symptoms in the human cases were somewhat severe, but all the patients recovered; recovery might not be complete for as long as three months, though usually in a month or so. The chief complaints were nausea, vomiting, a metallic taste, colic, diarrhoea, weakness and numbness of the legs; peculiar symptoms were certain paraesthesias and visual disturbances. The paraesthesias were mainly oral—tingling and burning sensations in lips, mouth and tongue, and itching, and "cold fluids felt as hot." Symptoms might come on in a few minutes after eating the fish, but in one patient there was an interval of 22 hours.

The author discusses the various theories of causation, which are to be found in the text-books, but is unable to contribute anything fresh. The toxin occurs in the larger fish, at spawning time, and is not removed or destroyed by cooking or salting. Outbreaks such as this are known to occur in Cuba, Porto Rico, the Virgin Islands, Jamaica, Turks Island and Barbados, usually in late summer, August–October, or in the months November to the end of January. As the cases recorded here occurred in May they were unusual. Treatment is purely symptomatic—rest in bed, administration of a purgative, and the use of mustard baths.

The poison, clearly a neurotoxin as well as an intestinal irritant, calls for further investigation. The author gives a useful list (appended here) of the species of fish regarded as poisonous in the Porto Rico–Virgin Islands regions.

I. CARANGIDAE (Jacks).

Amberjack or madregal	*Seriola falcata.*
Yellowjack	*Caranx bartholomaei.*
Skipjack or cavalla	*Caranx ruber.*
Horse-eyed Jack, jurel	*Caranx latus.*

II. SCOMBRIDAE (Mackerel).

Kingfish or sierra (cera) or pintado ...	*Scomberomorus cavalla.*
	Scomberomorus regalis.

III. SPHYRAENIDAE.

Barracuda (large variety)	*Sphyraenidae barracuda.*

IV. LUTIANIDAE.

Red Snapper...	*Lutianus aya.*

H. Harold Scott.

i. JIMÉNEZ-DIAZ (C.), RODA (E.), ORTIZ DE LANDÁZURI (E.), MARINA (C.) & LORENTE (L.). Investigaciones sobre el latirismo. II. Comunicación : El cuadro clínico. [**Studies in Lathyrism. II. Clinical Picture.**]—*Rev. Clin. Española.* 1942. May 15. Vol. 5. No. 3. pp. 168–177. With 10 figs. [13 refs.] French summary.

ii. ——& VIVANCO (F.) Estudios sobre el latirismo. III. Comunicación : Intentos de reproducir en los animales el latirismo por una dieta de harina de almortas (*Lathyrus sativus*). [**Studies in Lathyrism. III. Attempts to reproduce the Symptoms of (so-called) Lathyrism by feeding Animals on the Flour of** *L. sativus*.]—*Ibid.* May 30. No. 4. pp. 234–241. With 7 figs. French summary.

[These articles are II and III of a series ; No. I has not been received at the Bureau and there is no indication in these as to the aspect dealt with in the first communication.]

i. In the clinical account 23 cases are considered, all but one being males ; their ages ranged from that of a child of 6 to an adult of 55 years, ten of them between 18 and 40 years. The onset may be very acute, even fulminating ; thus, one patient had painful cramps in the night and the following morning was unable to walk. More usually there are prodromata for some days—chilly sensations, debility, fatigue, muscle pains, tingling, formication and increasing impairment of movement. The gait is peculiar, spastic, legs rigid, knees slightly flexed, later stiff, and movement is aided by the use of one or two sticks or even crutches. Attempts at walking are preceded by movements as if the feet were glued to the floor. There is no tremor, the arms and cranial nerves are not affected, paraesthesias may be present for the first 2–3 months of illness and occasionally loss of control of sphincters. In the early days pain may be severe in the calves, lumbar region and groins and, less often, the neck. The deep reflexes in the legs are exaggerated ; there may be clonus. The arms are not involved and the skin reflexes are normal. No affection of sensation could be detected. The attitude when standing is that of muscular hypertonus ; in short, the signs are those of involvement of the pyramidal tracts ; the general state of nutrition may be good. Treatment by vitamins is ineffectual ; strychnine is disappointing, in a fair proportion of cases quinine, grains 6 daily, seemed to benefit, while warm baths and massage relieved the spasticity, though usually only temporarily.

ii. The authors have carried out carefully a long series of experiments, feeding animals for as long as 9–10 months on the flour of the vetch, *Lathyrus sativus*. They used 195 rats, 6 rabbits, 6 dogs and a monkey. Details are given of each group but the results may be summed up by saying that in the rats growth was slow, but in none of the animals were any symptoms produced which could be said to resemble those of so-called "lathyrism." Post mortem changes were practically nil, except that in those dogs which had suffered from diarrhoea, meteorism and digestive disturbance there might be haemorrhages in the viscera and serous exudates.

H. Harold Scott.

CHOPRA (R. N.), CHOPRA (Gurbaksh Singh) & CHOPRA (I. C.). **Minor Drug Habits of India.**—*Indian Med. Gaz.* 1942. Jan. & Feb. Vol. 77. Nos. 1 & 2. pp. 34–41 ; 107–114. [13 refs.]

These are two interesting papers dealing with what the authors term "dopes." They begin by enumerating the points of difference

between " dopes " and the recognized addiction drugs. The authors' most important distinctions are that the " dopes " neither produce intense craving nor marked abstinence symptoms ; that they may include not only drugs but also foods ; that the consciousness of the individual is not diminished and that they include certain substances which exert stimulating or depressant effects on organs other than the central nervous system.

The authors classify dopes in three main groups : Group I comprises drugs used as dopes : Group II food and dietetic preparations and Group III the purine derivatives. There is also an interesting note upon the betel leaf and areca nut. We have not the space to summarize the accounts of all the materials discussed and, indeed, some of them, such as alcohol, ether, the barbiturates, chloral, paraldehyde, etc., do not conform with one of the authors' main criteria, *viz.*, that the dopes do not diminish the consciousness of the individual ; moreover, cocaine which they also include, is generally regarded as a true addiction drug, nor can the cocaine habit be classed as a " minor " one. As a vast literature is already extant concerning these, we will pass them by on this occasion.

Excluding these, the most interesting accounts of substances considered in Group I relate to the use of smelling salts, benzedrine, caffeine, certain circulatory stimulants and depressants, endocrine preparations and some metallic substances.

Smelling salts are stated to be particularly used by clerks and persons in sedentary occupations, chiefly in the Bengal, Bombay and Madras Presidencies. Used to excess they may provoke rhinitis and sinusitis and it has also been noted that their prolonged use leads to a craving.

The *benzedrine* habit has been found among some of the members of the medical and allied professions, but it has not spread to the general public. No evidence, however, of a true addiction has come to the notice of the authors. Among those who have contracted the habit, loss of appetite, dryness of the mouth, disturbed sleep, sweating and palpitation have been noticed. Beneficial as the drug is in selected cases, its abuse is to be deprecated.

Caffeine in alkaloidal form is not used as a habit-forming drug, but as tea and coffee it is one of the common doping agents used in India. Coffee in Southern India has displaced all other beverages. The effects of over-indulgence in these drinks are described and resemble those seen elsewhere. Excessive indulgence is not, however, very common in India.

Of the *aromatic analgesics* aspirin and coal tar derivatives are common dopes in India. Their prolonged use may give rise to palpitation, sweating and asthenia.

Among the *cardiac stimulants* camphor is commonly used in India. It may be used as the essential oil, or sometimes as an ingredient in the betel morsel, or sometimes in pill form. In large doses the drug may lead to a state of intoxication or even unconsciousness, but in small doses some persons exhibit an alert condition with a rapid flow of ideas. The authors have also met with a few instances of *ephedrine* habit. In one case there was bradycardia, and when the drug was withdrawn the pulse became feeble and there was a general asthenia.

Among the endocrine preparations, the authors have met with a few instances of the abuse of *thyroid* preparations with very serious results in some cases. But of far greater significance is the abuse of preparations of the metals *arsenic* and *mercury*. As regards *arsenic*, there are

many persons in India who take it habitually. It is generally taken mixed with butter or with sugar in the belief that it improves the general health and also as a prophylactic against certain infectious diseases and sometimes as an aphrodisiac. Its habitual use does not lead to any marked craving, but in cases of long duration there may be abstinence symptoms on withdrawal, which usually include epigastric pain, diarrhoea, asthenia and sometimes even collapse.

In respect of mercury, this is employed in the form of certain native preparations, the chief of which are *shingraf* and *makaradhuaja*. The authors do not state the composition of these. Mercury is believed by many Indians to be an excellent sexual and general tonic and is sometimes habitually taken with this in view.

Of preparations mentioned under Group II we can do no more than note that, according to the authors, the use of vitamin preparations is extremely popular in India and there is a voracious demand for them. While the effects of excessive indulgence in concentrated vitamin preparations have not been fully worked out, the possibility of their doing harm cannot be overlooked. Group III deals with tea and coffee, which have already been considered.

A long note on betel chewing concludes the two papers. The authors have examined 400 habitual betel chewers and find that excessive indulgence results in many pathological changes, among which are mentioned dental troubles, oral sepsis, dyspepsia, palpitations, neurosis and slow cerebration. More serious, however, is the evidence that betel-chewing definitely predisposes to carcinomatous growths of the mouth. The authors emphasize, however, that in their series the grave effects were observed only in excessive consumers, not in moderate or occasional indulgers. They speak with authority, for they have examined, in all, over one thousand betel-chewers. On the whole, they conclude that the objections to the habit are less serious than those to alcohol and tobacco. *E. W. Adams.*

WIGGLESWORTH (V. B.). **Some Notes on the Integument of Insects in Relation to the Entry of Contact Insecticides.**—*Bull. Entom. Res.* 1942. Sept. Vol. 33. Pt. 3. pp. 205–218. With 6 figs. [20 refs.]

The purpose of this paper is to show some of the ways in which the structure and physiology of the insect cuticle influence the entry through it of contact insecticides, particularly extracts of Pyrethrum in oil. Most of the experiments consisted in the application of Pyrethrum extracts to a constant area on the back of *Rhodnius prolixus* confined by a small glass ring cemented to the cuticle, and the recording of the rate at which symptoms of paralysis develop. The outermost layer of the cuticle is of a lipoid nature and the entry of Pyrethrum becomes progressively more rapid as it is dissolved in lighter and lighter petroleum oils in which the lipoids dissolve more readily. It enters extremely slowly when dissolved in vegetable oils. Entry becomes slower as the inner layers of the cuticle increase in thickness, as they do after the insect is fed; it is more rapid if the cuticle is stretched. In the adult Rhodnius entry takes place apparently chiefly through the ducts of the numerous dermal glands. Applied under these conditions the entry of Pyrethrum in the heavier petroleum oils is accelerated if 5 per cent. of oleic or some other long chain fatty acid is added.

V. B. Wigglesworth.

MELNIKOV (N. N.), SUKHAREVA (N. D.) & FEDDER (M. L.). **Structure and Insecticidal Properties of Organic Compounds.**—*C. R. Acad. Sci. U.R.S.S.* Moscow. 1941. Vol. 31. No. 6. pp. 610–613. [24 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Sept. Vol. 30. Pt. 9. p. 144.]

Since systematic investigation of large groups of organic compounds would probably show that certain substances non-injurious to man and the higher animals possess insecticidal properties and so could be used to control the vectors of diseases known to be transmitted by insects, a series of esters of chloroacetic, thiocyanoacetic and α-thiocyanobutyric acids were synthesised by methods that are described, and the minimum concentrations, in emulsions of soap and water, lethal to *Pediculus humanus*, L. (*vestimenti*, Nitzsch) were determined by immersion. Ethyl acetate and pentyl acetate were used for comparison. The thiocyanoacetates were also tested against eggs of *P. humanus* and against eggs and other stages of *Cimex lectularius*, L. From the results, which are shown in a table, it is deduced that esters of acids containing a substituted thiocyano radicle (SCN) are much more potent insecticides than the corresponding esters of acids containing substituted chlorine (Cl) or esters having no substituted group in the hydrocarbon radicle of the acid; that insecticidal efficiency increases in the thiocyanoacetate series (excluding methyl thiocyanoacetate) with the increase of the molecular weight of the alcohol radicle, and increases in the α-thiocyanobutyrates to a maximum in pentyl α-thiocyanobutyrate and then decreases; that in the majority of the cases investigated the insecticidal efficiency of the esters decreased somewhat as the molecular weight of the hydrocarbon radicle of the acid increased; and that the insecticidal efficiency of allyl thiocyanoacetate and allyl- α-thiocyanobutyrate differs little from that of the corresponding propyl esters.

RICHARDS (A. G.), JR. **Differentiation between Toxic and Suffocating Effects of Petroleum Oils on Larvae of the House Mosquito** (*Culex pipiens* (**Diptera**).—*Trans. Amer. Ent. Soc.* Philadelphia, Pa. 1941. Vol. 67. No. 3. pp. 161–193. With 4 plates. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Aug. Vol. 30. Pt. 8. pp. 124–125.]

Evidence has accumulated to show that the more volatile petroleum oils have a directly toxic effect on insects, and it has been presumed that since the non-volatile oils kill very slowly and are generally classed as non-toxic, their effect must be due to asphyxiation only. The literature does not show whether or not asphyxiation is an added factor in death due to toxic oils. An account is given of experiments carried out with larvae of *Culex pipiens*, L., which showed that suffocation and oil-toxicity produce different histo-pathological pictures in the central nervous system, both of which may be observed in lethargic larvae capable of recovery, and that all oils, whether volatile or non-volatile, as usually applied in mosquito control, lead to histologically demonstrable effects of suffocation. With extremely toxic oils, this does not materially alter the time needed to kill. With less toxic oils, the results are rather variable, but a mean acceleration of killing time is imposed when asphyxiation is also a factor. Larvae submerged in water of

low oxygen content die in about 70 minutes, but in aerated water, cutaneous respiration can sustain life for considerable periods. Immersion of larvae in aerated paraffin oil, a non-volatile oil, did not prevent them from respiring if the cuticle was dried before immersion, but death followed promptly when the cuticle was wet. It is concluded that air-dried larvae immersed in aerated paraffin oil probably do not die from asphyxiation and that adequate cutaneous respiration depends on direct contact between the oil and the cuticle. A summary and discussion are given of the literature on the suffocation of mosquito larvae and a discussion of cutaneous respiration in insects with particular reference to such respiration in water and in oil.

HAFEZ (M.). **Investigations into the Problem of Fly Control in Egypt.**—*Bull. Soc. Fouad 1er Ent.* Cairo. 1941. Vol. 25. pp. 99–144. With 2 figs. [101 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Sept. Vol. 30. Pt. 9. pp. 136–138.]

This paper deals with extensive field observations and experiments on fly control in rural and urban areas of Egypt made over a period of about two years. Typical observations on breeding media and oviposition experiments are described for the principal species or groups of species considered. It is shown that *Musca domestica vicina*, Macq., the most abundant and important of the house-frequenting flies that may carry the causal organisms of prevalent diseases, utilises as breeding media, in addition to horse and donkey dung, human excrement, which is allowed to accumulate in heaps in or near the villages, and to a smaller extent, the dung of sheep and goats. The latter is more important than pig dung. Breeding also takes place in heaps of mixed dung containing a proportion of favoured kinds and in fowl droppings and household refuse, but hardly at all in cow or buffalo dung alone. *M. vetustissima*, Wlk., *M. sorbens*, Wied., *M. vitripennis*, Mg., *M. tempestiva*, Fall., *M. nebulo*, F., and *Philaematomyia* (*M.*) *crassirostris*, Stein, which are scarce in towns, breed chiefly in cow and buffalo dung in byres and in heaps on the farms, as the temperature generated during fermentation is only 30-35°C. [86–95°F.] and is very favourable to their development. Sheep and goat dung and human excrement are also attractive, the last particularly to *M. tempestiva* and *M. sorbens*. These two species will also breed in horse dung, particularly when it is mixed with that of bovines. Pig, donkey and fowl dung and household refuse are unattractive. *Stomoxys calcitrans*, L., breeds in the bedding in byres and calf pens in the country and in horse bedding removed from stables and exposed in the open near towns, but pure dung is not very attractive to it. Donkey dung deposited in stables and mixed with litter is sometimes used in the country, but sheep, goat and pig dung and human excrement very seldom. *Calliphora erythrocephala*, Mg., *Lucilia sericata*, Mg., and *Muscina stabulans*, Fall., are chiefly attracted to carrion, but owing to its rare occurrence, breed chiefly in human excrement. *M. stabulans* may breed in cow and horse dung and occasionally in household refuse.

The efficiency of various methods for the control of breeding in horse dung was tested, and their value is discussed. It is concluded that the most effective method is to induce fermentation, which will raise the temperature of the breeding medium above the lethal limit, by packing and watering the dung and turning over the upper layer in a

receptacle designed for the purpose. It is a rectangular three-sided wooden box, about 6 ft. long, 3 ft. wide and 20 ins. high, lined with zinc. The open front has a channel in which larvae that develop in the cooler outer layers of dung and try to escape are trapped in borax solution (4 oz. borax to 1½ gals. water), and there is a ledge projecting inwards to prevent any larvae from escaping upwards. The channel is protected from falling manure by a shutter. Two boxes are kept for alternate use. Dung is rammed into one every day until it is full, but a space of 10 in. must be left between the manure and the channel, and one of 6 in. between the surface of the heap and the projecting ledges. The borax solution is renewed daily after the liquid manure has been drained from the channel when the box is full, the shutter is fitted to the front and the dung left to finish fermenting, the surface being turned over and water added daily. During this time, the second box is filled. The temperature generated in the centre of the heap (66–92°C. [150·8–197·6°F.]) is sufficient to destroy all immature stages. A table is given showing the period of exposure to temperatures varying from 45 to 55°C. [113 to 131°F.] necessary to kill larvae in various stages of development. The longest exposure required was 10 minutes for mature larvae at 45°C. Although the upper surface of the manure is left exposed, no oviposition takes place in it as the fermenting dung brought to the surface is repellent. No eggs were laid when the dung was exposed after fermentation was complete. The value of the dung as a fertiliser is not impaired.

It is recommended that this method be used in conjunction with supplementary measures such as the application of insecticides. In stables for animals other than horses, bedding, which should be of straw, should be changed frequently and exposed to dry so as to kill developing larvae, and dung should be accumulated outside the stable and dried in disks to be used as fuel.

This practice, which is a common method of disposing of cow and buffalo dung, is described. It was found that third-instar larvae can complete development in the disks, but younger ones cannot. The dung must, therefore, be dealt with within 24 hours, so that the disks when formed do not contain third-instar larvae. The number of flies on farms where this practice was adopted was reduced to a tolerable minimum within about a month. On large farms, the dung is accumulated in very large stacks for use on the fields. The biothermic method was not successful in dealing with them as the heat generated in cow and buffalo dung during fermentation is not lethal to the larvae. It is recommended that such heaps should be kept to a manageable size, a solution of 1½ oz. borax in 2½ gals. water sprinkled over the heap, the fresh dung buried in the centre and the surface covered with a thick layer of dry soil. Five substances were tested for their larvicidal value when used for treating human excrement. Kerosene and phenol were ineffective, chloride of lime had good larvicidal and repellent properties, but borax at 2 oz. in 1 gal. water was the most effective. After treatment, the excrement should be covered with a thick layer of earth to prevent the odour from attracting the flies. In addition to these methods directed against breeding on a large scale, breeding in smaller accumulations of media should be reduced to a minimum by promptly burning garbage, disposing of the contents of cesspits at a place about a mile from the town or village and covering them with earth, cleaning roads, yards, etc., removing the fowl dung accumulated in houses and burying dead animals.

HAFEZ (M.). **A Study of the Biology of the Egyptian Common House-Fly : *Musca vicina* Macq. (Diptera : Muscidae).**—*Bull. Soc. Fouad 1er Ent.* Cairo. 1941. Vol. 25. pp. 163–189. With 9 figs. [51 refs.]

HARRELL (William B.) & MOSELEY (Vince). **The Surgical Treatment of Subdermal Myiasis due to Dermatobia Hominis.**—*Southern Med. Jl.* 1942. Aug. Vol. 35. No. 8. pp. 720–723. With 4 figs.

The history of infection by a larva of *Dermatobia hominis* is usually that the patient observes a small red raised spot which he mistakes for a mosquito bite ; this enlarges to resemble a furuncle but is not very tender, though there may be intermittent sharp neuralgic pains with the " sensation of something crawling beneath the skin." Inflammation is usually moderate with little surrounding reaction, but, if the larva is active, a bubble shows at the crater.

For successful treatment the larva must be removed completely, the invaded tissue cleansed and the devitalized tissue dealt with to prevent necrosis and abscess formation. To seize and remove an active larva is difficult ; injection of ether or chloroform kills the larvae but causes the patient no little pain and may give rise to wide sloughing, and healing is slow.

The following is the authors' technique : The site is cleansed ; a 2 per cent. aqueous solution of procaine hydrochloride is injected intracutaneously in a circle of weals round the lesion and a spoke pattern of subdermal injections through the weals. The larva is then anaesthetized by injection into the larval cavitation. Bubbling ceases and the crawling sensation is no longer felt. As a rule about 10 cc. of the injection will suffice. An incision is then made, the larva lifted out, the track irrigated with normal saline and lightly curetted, then packed with a mixture of sulphanilamide and sulphathiazole in equal parts, which prevents the suppuration common with the previous methods of treatment. The wound is now closed with interrupted small dermal sutures. Convalescence is rapid ; in fact, the patient may keep up and about and need not be confined to bed. *H. Harold Scott.*

GUNTSCHEFF (Nikola). Myiasis linguae—2 Maden der Wohlfartia magnifica in den Papillae circumvallatae einer vorher gesunden Zunge. [**Myiasis of the Tongue. Occurrence of Two Larvae of *W. magnifica* in Circumvallate Papillae of Previously Healthy Tongue.**]—*Deut. Ztschr. f. Chirurgie.* 1942. July 20. Vol. 255. No. 11 & 12. pp. 751–755. [11 refs.]

Careful clinical description of a single case in man, in Bulgaria.
P. A. Buxton.

FISCHER (Otto). Die Beurteilung der Eignung für den Aufenthalt in den Tropen. [**Fitness for Life in the Tropics.**]—*Muench. Med. Woch.* 1942. Jan. 30. Vol. 89. No. 5. pp. 93–98.

This paper is written in the most general terms, and there is little attempt to prove the statements made, by reference to investigations undertaken or to experience gained in actual practice. It consists largely of a list of diseases or abnormalities which are likely to be adversely affected by tropical conditions, or which should be corrected before going to the tropics. The importance of general health is stressed, and emphasis is laid upon diseases of the nervous system and

on the fact that not only climatic conditions, but also social surroundings, are often very different in the tropics from those in Europe, and that in judgment of suitability the physician should take into account the whole personality of the prospective emigrant.

C. W.

HEISS (F.). Hitzeschäden und ihre Behandlung. [**The Effects of Heat and their Treatment.**]—*Med. Klin.* 1942. Aug. 7. Vol. 38. No. 32. pp. 749–751.

The author's descriptions of heat collapse, heat cramp and heat stroke do not differ from those generally given. He mentions the sequelae of heat stroke, which may include herpes labialis and paraesthesiae of the trigeminal nerve in addition to the severe psychological changes which are more well known. In treatment he does not produce any new ideas, but notes that, in view of the sequelae, medical observation should not be remitted too soon.

The author accepts the view that sunstroke is due to an effect of the rays of the sun on the meninges, giving rise to serous meningitis with stiffness of the neck and Kernig's sign. He states that the back of the neck, on account of the closeness of the medulla to the surface, is the most vulnerable part of the body to the sun's rays, and emphasizes the necessity for protection. [This is the old view. The author produces no evidence in support of his dogmatic statements.]

C. W.

TENNER (K.). Dauerschaden durch Hitzschlag. [**Permanent Damage from Heat Stroke.**]—*Muench. Med. Woch.* 1942. July 10. Vol. 89. No. 28. p. 622.

Permanent damage resulting from heat stroke is rare; cerebellar lesions, epilepsy, hysteria, tachycardia and myocardial injury have been described. The author records the case of a soldier, aged 28, who collapsed and became unconscious, during a march in June 1940. On arrival in hospital he was found to have some paresis of the left arm and leg, with diminished sensibility. Speech was slow, the tongue protruded to the left, there was spasticity of the left arm and leg, but reflexes were equal. The patient was nervous.

The condition, which was present six months later, may have been due to vascular damage in the acute phase; it resembled acute encephalitis, such as has been described in some cases, with subsequent degeneration in the cerebral ganglia.

C. W.

GAY PRIETO (J.), LÓPEZ DE AZCONA (J. M.), AZÚA (L.), BONDEU (F.) & CÁRDENAS (M.). Investigaciones experimentales sobre un caso de urticaria solar. [**Experimental Investigation of a Case of Solar Urticaria.**]—*Rev. Clin. Española.* 1942. Feb. 15. Vol. 4. No. 3. pp. 173–178. With 4 figs. [22 refs.] French summary.

A woman, 35 years of age, without any preceding illness, began in the summer of 1939 to suffer from red spots and very itching urticarial weals on parts exposed to the sun. The following summer, during a short stay by the sea, she had a very severe attack of urticaria with violent headache and slight fever. Since that time, exposure to the

rays of the sun for a few seconds has been followed by an outbreak of weals, very irritating and becoming confluent. The authors proceeded to carry out three series of experiments :—

(1) *Experimental Production of Urticaria.*—The patient's shoulder was exposed to the light of a quartz lamp at a distance of 60 cm. for 40 seconds. Four minutes later an erythema appeared, intensely itching; then in the centre there developed small weals which became confluent to form one huge weal the size of the erythematous patch, raised 3–4 mm. It lasted thus for half an hour, then began to fade and had disappeared altogether in 40 minutes. Further experiments showed that exposure for 3 seconds led to erythema and pruritus without urticaria, but 5 seconds or more produced urticaria also. Exposure for 6 minutes to a Solux lamp at 40 cm. distance caused no change in the skin—the rays of the visible spectrum near the red and the infra-red are devoid of any urticarial effects. Next, they found that rays of a length above 3,000 Å, *i.e.* between the ultra-violet and the visible spectrum, were those causing the urticaria, and, in this patient, rays between 2,000 and 3,400 Å, in particular 3,200 Å.

(2) *Study of the Mechanism of the Urticarial Reaction.*—First, the authors found that the outbreak of solar urticaria was accompanied by haemoclasic shock, with leucopenia and lymphocytosis (leucocytes reduced by 4 minutes' exposure to the lamp at 60 cm. from 8,200 to 5,700 per cmm. and arterial tension was lowered). Next, on the hypothesis that the urticaria was an allergic reaction, they tried to demonstrate the antigen which provoked the reaction to the sun's rays. They showed by gastric analyses that the radiation did not set free histamine, at all events in quantity sufficient to stimulate the gastric secretion.

One of the authors then injected into his forearms 0·2 cc. of the patient's serum and covered the site to protect from the luminous rays.

Twenty-four hours later he exposed them to the quartz lamp for 5 minutes and after another 15 minutes the sites of injection became weals the size of a bean, with a red, itching periphery, persisting for 2 hours. It was clear that the patient's serum contained a substance capable of reacting with *something* which is set free in other individuals on exposure to radiations of a certain wavelength.

(3) *Attempts at Treatment.*—It was not possible to lower the patient's susceptibility to the sun's rays, so the authors tried to find something which would protect her from the radiations, and finally prepared a cream containing chloride of copper 3 gm., distilled water, vaseline and lanolin, of each 10 gm. [This the authors call 3 per cent. of $CuCl_2$ throughout the paper and state that in this strength it can be used daily without harm. The strength of the preparation is, of course, 10 per cent.]. The skin smeared with this and another part for control were exposed to the lamp for 6 minutes. The protected zone showed no change, the control area in 3½ minutes was red and irritating and, later, urticarial. *H. Harold Scott.*

SONNENSCHEIN (Curt). Haus- und Krankenhausbau in den Tropen. [**House and Hospital Construction in the Tropics.**]—*Deut. Trop. Zischr.* 1941. June 1. Vol. 45. No. 11. pp. 326–334. With 10 figs.

This article, which is well illustrated, consists chiefly of a general statement of the many points to which attention must be paid by

those who are responsible for building houses and hospitals in the tropics. The importance of collaboration between the sanitary engineer and the public-health officer is stressed ; so also is the need for careful selection of suitable sites and building materials.

No reference is made to the urgent need for research into methods of providing improved environmental conditions for residents in the tropics. *John W. D. Megaw.*

UTTLEY (K. H.). **Heights and Weights of Cantonese Adult Males.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. Jan. 31. Vol. 35. No. 4. pp. 223–228. With 1 graph.

REVIEWS AND NOTICES.

PEARSE (A. S.) [Professor of Zoology, Duke University]. **Introduction to Parasitology.**—pp. ix+357. With 448 figs. 1942. Charles C. Thomas : 220 East Monroe Street, Springfield, Illinois. [$3·75.]

This book is intended for college students, and aims at giving them a general view of the field of parasitology. In this aim it should succeed well. The volume is profusely illustrated with clear figures ; these are placed in close association with the relevant text matter, which is excellently printed on good paper. Not unnaturally, in a study which ranges from the amoebae to the vampire bats and takes in its stride the rest of the unicellular animals, the worms and the arthropods, treatment of individual subjects is brief. Exceptions to this general rule are the special chapters on "hookworms," 10 pages ; "worm eggs and examination of faeces for animal parasites," 10 pages ; "methods," 15 pages ; and "malaria," 20 pages. *Plasmodium ovale* does not appear among the species of malaria parasite, and in a section on treatment and prevention mepacrine (atebrin) is not mentioned. The author disarms criticism, however, by stating that he has laid enough emphasis on parasites of man to furnish "human interest."

Without doubt this is a hearty book on parasitology, written by one who has great zest for the subject. "No parasite," it concludes, "ever wrote a poem, drew an animated moving picture, led an army, or endowed an orphan asylum or a university. Get busy, fellows !"

Among the shoals of students who are interested in social problems he would be a poor fish who did not rise to the challenge of that last decorative and bristly fly. All the better for Pearse's Parasitology.

D. B. Blacklock.

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
By the South Essex Recorders, Ltd., Ilford.

(2224) Wt. P1676/260 1,725 1/43 S.E.R. Ltd. Gp. 432.

LIST OF GOVERNMENTS CONTRIBUTING TO THE BUREAU OF HYGIENE AND TROPICAL DISEASES.

The Bureau is maintained by official grants from the following Governments given in the proportion of approximately one-sixth from Imperial funds, one-twelfth from the Dominions and the balance from the Colonies and Protectorates and other sources listed :—

Great Britain.

Commonwealth of Australia.
New Zealand.
Southern Rhodesia.
Union of South Africa.

Bahamas.
Barbados.
Bermuda.
British Guiana.
British Honduras.
British North Borneo Company.
Brunei.
Ceylon.
Cyprus.
Federated Malay States.
Fiji.
Gambia.
Gibraltar.
Gold Coast
Hong Kong.
Iraq.
Jamaica.
Kenya.
Leeward Islands.
Mauritius.
Nigeria.
Northern Rhodesia.
Palestine.
Sarawak.
Sierra Leone.
Straits Settlements.
Tanganyika Territory.
Trinidad.
Uganda.
Unfederated Malay States.
(Johore, Kelantan, Kedah and Perlis, Trengganu).
Zanzibar.

Bengal
Bihar and Orissa.
Burma.
Central Provinces.
Madras.
Punjab.
United Provinces.

Sudan.

The Bureau also receives contributions towards its maintenance from the Indian Research Fund Association.

BUREAU NOTICES.

The Director will be glad to receive early copies of works or reprints on Tropical Diseases for notice in the *Tropical Diseases Bulletin* and for the Library.

Publications of the Bureau of Hygiene and Tropical Diseases.

TROPICAL DISEASES BULLETIN

containing classified summaries of current papers and reports from the medical and scientific publications of the world on diseases of the tropics and warm countries.

(ISSUED MONTHLY.)

Subscription rate (in advance) : 21 shillings per annum post free. The subscription runs from January to December. Single numbers 2s. 6d. each.

SUPPLEMENTS TO THE TROPICAL DISEASES BULLETIN

summarizing the Annual Medical and Sanitary Reports from British Colonies, Protectorates and Dependencies.

(ISSUED ANNUALLY.)

Back Supplements can be supplied as follows :—

Dec. 1931	SUPPLEMENT dealing with the Annual Reports for	1929	Price 2s. 6d. net.
Oct. 1932	" " " " "	1930.	Price 2s. 6d. net.
Oct. 1933	" " " " "	1931.	Price 5s. 0d. net.
Dec. 1934	" " " " "	1932.	Price 5s. 0d. net.
Nov. 1935	" " " " "	1933.	Price 7s. 6d. net.
Oct. 1936	" " " " "	1934.	Price 7s. 6d. net.
Nov. 1937	" " " " "	1935.	Price 7s. 6d. net.
Nov. 1938	" " " " "	1936.	Price 7s. 6d. net.
Nov. 1939	" " " " "	1937.	Price 7s. 6d. net.
Dec. 1940	" " " " "	1938.	Price 7s. 6d. net.

Publication of the later Supplements is temporarily in abeyance.

BULLETIN OF HYGIENE

containing classified summaries and reviews of publications on all branches of public health and preventive medicine.

(ISSUED MONTHLY.)

Subscription rate (in advance) : 21 shillings per annum post free. The subscription runs from January to December. Single numbers 2s. 6d. each.

ORDERS and SUBSCRIPTIONS may be sent direct to the

BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street,
Gower Street,
London, W.C.1

or through any bookseller.

Cheques and Postal Orders should be made payable to the "Bureau of Hygiene and Tropical Diseases," and crossed "Westminster Bank Ltd."

The Bureau has from time to time obtained, by purchase or otherwise, copies of journals or monographs for its correspondents. In view of the difficulties which the ordinary agent meets in carrying out commissions of this kind, the Bureau is prepared to do its best to obtain such publications or photogram copies of particular papers, for any of its subscribers. Out-of-pocket expenses will be met by the applicant, who should state the amount he would be prepared to pay for the journals or monographs or photogram copies required, and, when possible, send a money order with his application or a reference to an agent who will meet the cost incurred.